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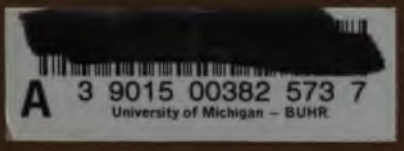
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THE President and Council of the Medical and Chirurgical Society, have great pleasure in offering to the Public, the Sixth Volume of its Transactions, trusting that the number and importance of its Contents, while they evince the growing utility and reputation of the Society, will be found essentially conducive to the great objects of its institution, the increase and diffusion of Medical and Chirurgical Knowledge. The numerous communications laid before the Society during the last Season, and particularly towards the close of it, have caused this Volume to appear later than the period originally intended for its Publication.

From the Articles of this year it will be perceived, not only that the Medical Department

of the Army has continued its communications, but that one of the branches of the Legislature, the several Public Offices of the Navy, and the Honourable East India Company, have allowed the Society access to their records, from which much interesting and valuable information has been derived. This liberal co-operation, so honourable to these bodies, and so flattering to the Society, is gratefully acknowledged by the President and Council.

The Society's Library has received numerous important additions during this year, particularly from the large importation of foreign works, and from the purchase of several rare and expensive books of plates. These accessions have necessarily delayed the printing of the Catalogue; but they will increase its value in a much greater proportion. The President and Council will still continue their attention to this object; and they hope that the Library, which they believe at present to be much more comprehensive and valuable than any collection of medical books hitherto formed in England, will soon

arrive at a degree of perfection worthy of the Society, and of the Country.

In consequence of the increasing number of communications, and the inconvenience experienced from their accumulation at the end of the Season, the President and Council beg leave to inform the Public, that it is the intention of the Society, in future, if sufficient materials shall be furnished, to publish their Transactions twice a year. The papers which shall be received before the Anniversary Meeting on the first of March, will be printed in a part or volume at that time; while the remainder will be published at the end of the Season.

Communications are, as usual, received by the President or Secretaries; and may be transmitted through any other Member of the Society.

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December 6, 1815.

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AN ACCOUNT

OF THE

ORIGIN AND PROGRESS

OF THE

PLAGUE

IN THE

ISLAND OF MALTA,

IN THE YEAR 1813.

By ROBERT CALVERT, M.D.

PHYSICIAN TO THE FORCES.

COMMUNICATED BY

DR. BATEMAN.

Read April 11, 1815.

THE following communication has two objects in view; first, to give a faithful narrative of the introduction and progress of the Plague at Malta, in the year 1813; and, secondly, to ascertain from induction of facts, the laws of pestilential contagion, so as to direct us in the employment of preservative means; but particularly as relates to the construction of lazarets, and to the admission of people, known to be infected, within our ports.

Towards the accomplishment of these two ends, the most prominent circumstances that occurred during the pestilential season are selected, while the principal proclamations and other public documents are given without comments, that the facts themselves may be seen without the colouring which they might receive from argument.

Lastly, my opinions and reasonings are deduced from these facts, referring to them as occasion requires, as well as from collateral evidence which I have collected in the course of my reading. If these opinions are at variance with the opinions of others, and particularly of those who had the immediate management of the disorder, it is by no means intended to impute to them any blame or neglect whatsoever. On the contrary, the zeal and exertions of those praiseworthy individuals, on so trying an occasion, merit the warmest gratitude of the surviving population. I do not believe, as it will be seen, that the plague found its way into the island and spread itself from want of exertion on the part of Government, or of the department of health; for almost every human means were put in force in conformity with the popular doctrine of pestilential contagion; but the grand and fundamental error, I believe, was wholly and solely in the doctrine itself.

Narrative of the Plague at Malta, in the year 1813.

On the 29th of March, a vessel called the San Niccolo, arrived at Malta from Alexandria, in Egypt; the master of which informed the officers of health, as he came into port, that he believed the ship was infected with plague, having lost two men during the voyage of what he strongly suspected to have been that disorder, particularly as it was raging at Alexandria, when he left that place. One of the men, he said, had a black tumour upon his neck, to which he himself had applied poultices. He also added, that as soon as the two men died, he immediately suspected the nature of their disease; and, by way of precaution, ordered the hatches of the ship to be closed, and kept the men on deck. This happened about a week previous to his arrival in Malta; and during the interval they had eaten nothing but a few biscuits that happened to be left on deck.

The master and surviving part of the crew, being apparently healthy, were permitted to disembark in the lazaret; not, however, before they had taken the usual precautions of shaving their heads, washing themselves with sea-water, and afterwards with vinegar, and of leaving their clothes behind them in the ship.

As the crew consisted of men of different nations, they were divided into companies accordingly, each company being provided with two apartments in the lazaret: and, as the captain and his servant were both Maltese, they lived together.

The whole continued, in appearance, to enjoy the most perfect health till the first of April, when on the afternoon of that day, the captain, while playing at ball, was suddenly seized with headach, giddiness, and other symptoms of plague; and he died in the course of about thirty-six hours. His servant, who had also assisted the sick men on board, was seized about the same time with similar symptoms, and he died after a like interval. They were both buried in the lazaret.

While these things occurred on shore, the usual precautions with regard to the ship were not neglected. She had remained in the middle of the quarantine harbour from the time of her arrival, with two guard-boats stationed near her, to prevent every kind of communication; and she continued in this situation near a fortnight, at the end of which time, a number of men were hired, for a considerable sum, to conduct her back to Alexandria.

The ship and the whole of these men arrived safe in Alexandria, and the cargo was afterwards

taken out without a single individual being infected, as appears by the following letters from the British consul at that place, addressed to Lieutenant-General Oaks, the King's commissioner at Malta.

(TRANSLATION, No. 1.)

"May it please your Excellency,

"It is with the greatest satisfaction I have the honour to inform you of the safe arrival here on the 4th of May, of the brigantine, S. Niccolo, Captain Alexander Scarneo. Besides, the crew are all in perfect health.

"As no quarantine is observed at this place, the crew had permission to leave the vessel whenever they pleased. As to the disposal of the cargo, we are in daily expectation of an order from his Highness the Viceroy."

May 8th, 1813.

(No. 2.)

"In addition to what I had the honour to communicate to your Excellency on the 8th of May, by his Majesty's sloop, Badger, respecting the brigantine, S. Niccolo, commanded by Alexander Scarneo, I have now to inform your Excellency, that the brigantine has been entirely unloaded, and that the clothing, bedding, &c. have been disembarked, and that I ordered the vessel to be ventilated, washed, fumigated, and white-washed throughout every part; to be painted without, and the

sails and rigging to be washed, and the seams pitched. I have the pleasure to add, that no person employed in unloading the brigantine has been attacked with plague, and that this disease has almost entirely disappeared here."

(Signed) STEFANO MALTAS,
British Consul.

June 1st, 1813.

As the survivors of the original crew continued healthy in the lazaret of Malta, and as the dreaded ship no longer remained in the harbour, the deluded inhabitants began to congratulate themselves on their supposed happy escape.

But, on the 19th of April, a Maltese physician, Dr. Gravagna, being called to visit a child of the name of Borg in *Strada S. Paolo*, found it in a dying state, of what he then believed to be a typhous fever; he observed a carbuncle on its breast; but as this was small, and as the family were subject to cutaneous disorders, the real nature of the disease was not suspected. The child had been ill five or six days.

On the 1st of May, the same physician was again called to see the mother of this child, whom he found affected with fever, accompanied by a painful tumour in the superior inguinal glands. On the 3d, she was delivered of a child of seven months, which died as soon as it came into the world. In

the course of the same day, another tumour of an inflammatory nature was perceived in the glands of the other groin of the mother, and she died before the next morning.

During the sickness of the mother, another child was attacked with fever, which however did not prove mortal.

The father of this unfortunate family, Salvator Borg, had not long to bewail the loss of his wife and infant, before he himself was threatened with a similar fate. On the morning of the 4th, he was attacked with fever, accompanied with glandular swellings in the axilla and groin.

Dr. Gravagna, being now no longer in doubt as to the nature of the disease, related every thing that had happened, to the deputation of health. On hearing the account, they immediately ordered that not only Borg's family, but every individual proved to have had the least communication with it, should be instantly removed to the lazaret; and this order was executed with the greatest care and industry.

The following notification was then issued to the inhabitants.

(TRANSLATION.)

" His Excellency the King's civil commissioner, being informed by the committee of health, that two individuals inhabiting the house, No. 227,

Strada S. Paolo, in this city of Valetta, have, during a disease that terminated fatally, exhibited strong symptoms of plague; and that another individual of the same family has been attacked with a disease similar in its symptoms, has judged it essentially necessary, that, besides the removal of the diseased and of all those who had had too much communication with the family, to the lazaret, the following measures of precaution, and other measures of the said committee, are to be put in execution.

"1. That, during the present state of anxiety and uncertainty, the departure of all ships shall be suspended.

"2. That, with a view of securing as much as possible the public health, till the real existence of the threatened malady be ascertained, the courts of justice, the theatre, and other places of great assemblage shall be shut; and that, at the same time, the business of the respective offices of government shall be restricted, as far as may be consistent with the exigences of the public service.

"3. That the city and all its suburbs, as also Victorioso, Senglia, and Conspicua, shall be immediately placed under the inspection of physicians, who, together with other inhabitants of respectability, shall make daily visits to their respective districts; and report the result of their observations to the committee of health for their information.

" Further regulations will be published from time to time through the medium of the magistrate of police, as may be most expedient. In the mean time, his Excellency thinks proper to observe, that the committee of merchants have, by way of precaution, adopted various wise and praiseworthy regulations to be observed amongst themselves.

" While his Excellency thus fulfils the sacred duty of enjoining the proper observance of these precautionary measures, it is with particular satisfaction that he is able to communicate to the public the following extract of the report, that has been just sent to him from the committee of health, by means of which, the public will be made acquainted with the result of the information received from every district.

(EXTRACT OF THE REPORT.)

" ' The committee of health at its present meeting, observes with pleasure, that from the reports they have received from the different physicians and surgeons, both civil and military, it appears that the city is at present totally free from every species of contagious disease, with the exception of the family of the shoemaker, Salvator Borg, (who is now transported to the lazaret) with regard to which the committee sees no reason to diminish its suspicions.'

' *May 5th*, 1813.'

"The King's civil commissioner believes it necessary, in such a conjuncture, to assure the public that every vigilance and authority, that a tender regard for the welfare of the population can suggest, will be called forth by himself and every other functionary of government; and while he anxiously expects that every member of society will wish to come forward in his respective line of life, and freely give his assistance, he humbly confides in the goodness of Divine Providence, that an exemption from one of the greatest of human calamities may be obtained."

"*May 5th*, 1813."

On the 6th of May, a gentleman, named Delicata, went to see an old woman, who was his relation, residing in Strada S. Ursolo, and who had performed the office of midwife to Mrs. Borg. After knocking at the door several times without gaining admittance, he forced it open, and saw the old woman kneeling at her bed-side, as if at prayer. Seeing she did not move, he took hold of her and shook her, but, to his great surprise, he perceived she was dead. He instantly ran to the committee of health to inform them of the circumstance, when instead of permitting him to return home, they sent him to the lazaret, and by this prompt measure they probably saved his wife and family; for, on the 17th, he was seized with plague, and died in the course of twenty-four hours.

Notwithstanding the sudden death of this old woman, whose name was Agius, that of a young woman in the Maltese hospital, who was said to have been burnt to prevent investigation, and the sickening of a boy called Briffa, who lived at Slienca, and whose father shortly afterwards fell a sacrifice to the plague, the reports of the medical practitioners, who examined the bodies, continued to announce the non-existence of pestilential symptoms.

On the 7th of May, the *luogotenenti* (magistrates) of the districts, and others appointed to make inspections, were incorporated with the committee of health, to further their operations, as organs of communication between them and the people. The dogs and cats were ordered to be kept within doors, and people belonging to ships were commanded to remain on board, except where they should have occasion to go for provisions to a place appointed for the purpose. The people were recommended to avoid crowding together, and to keep at home as much as possible; to keep their houses and every thing about them clean. The selling of clothes, skins, &c. in the streets was prohibited, and mendicants were prevented from going about.

On the 8th of May, the committee announced the death of the boy Briffa. They also announced the death of another boy called Falzon, who lived

at No. 150, Strada S. Paolo. The fever of which he died, however, was accounted for from his having fallen into the sea. Although no marks of pestilence could be found upon the bodies of these two boys after death, it is extremely probable that both died of plague; for the father of the first died of this disease in the lazaret shortly afterwards, while five of the family belonging to the latter were attacked with it in succession.

On the 9th the committee announced the death of Borg's father, a man eighty years of age; also that of a febrile patient on the road from Taraxien to the lazaret. They likewise mentioned the discovery of a boy on the Marina Stairs, who had been attacked with a large *scirrhous* tumour under the pectoral muscle; but in none of these were the marks of pestilence discovered.

On the 10th they recommended the punctual continuance of domiciliary visits in every part of Valetta and the villages. They also recommended the respectable inhabitants, who occupied the higher apartments, to watch over the health of those beneath them; and that a general purification of all the houses in the island should be immediately commenced, while the old and useless clothing should be burnt.

On the morning of the 12th of May, Salvador Borg expired, and on his body being examined on

the following morning, the examiners pronounced that the symptoms under which he laboured were *pestilential* and *contagious*.

The general report, however, of the physicians continued favourable. The committee renewed their solicitations with regard to the inhabitants keeping themselves and their children within doors, recommending, at the same time, that families should employ people from without to procure the necessaries of life, which should be received in a pail of water; that money should be received in vinegar; that papers should be smoked, and that the linen should be washed in the house.

The report of the 14th stated that another son of Salvator Borg, two years of age, had been taken ill with two furuncles attended with slight fever, but that he was cheerful and took nourishment; that two Greeks, who had assisted Salvator Borg, continued in perfect health; and that the medical reports stated, that no other case worth notice had happened in the whole island.

The medical report of the 13th was favourable; but a girl named Grazia Pisani, who had been accustomed to sleep in the house of Maria Agius, and who was carried to Fort Manuel on the 8th, in consequence of being a little feverish, shewed some indications of an affection of the glandular system.

Hitherto the committee of health seems to have believed that the disease was completely in their power, and that the only seeds which had taken root were securely shut up within the ramparts of Fort Manuel and the lazaret. But on the morning of the 16th, the town, as well as the committee, was electrified by its being proclaimed that the daughter of a baker, called Stellini, No. 92, Strada S. Cristoforo, had died of plague, and that another of his sons was moribund. They had both been labouring under fever from the 14th. On the same day they also found a Greek who had died of the same distemper, and that four other persons were then labouring under similar symptoms.

The committee of health observing the disease developing itself in so many parts of the city at the same time, and foreseeing the difficulty of continuing to separate the diseased from the sound, came to the resolution of permitting the infected to remain in their respective houses, provided they were sufficiently commodious to admit of their being separated from the healthy part of the family; such houses however were to be placed under a proper guard, and kept in a rigid state of quarantine. This resolution was notified to the public on the 16th of May.

On the 17th his Excellency issued the following proclamation.

" His Excellency the King's civil commissioner, being informed by the committee of health, that many people, from the fear of being taken to the lazaret or Fort Manuel, and thus evading the advantages that would be offered to themselves as well as to society in general, hide from the deputies of the districts and every one else the diseases with which they become affected; by which means every one must know how much mischief arises, not only to the sick themselves, but to the public in general, placing it out of the power of any one to render them relief, and cherishing a disease, which, when concealed, becomes infinitely more deadly. His Excellency considering further, that the orders given for employing the necessary precautions have not been properly understood and executed by all; and considering moreover what universal prejudice to the public would naturally arise under the present circumstances from robbing suspected houses; and, considering lastly, that it would be interesting beyond every other thing to bring to light the origin and means of introduction of the contagion, orders and commands as follows:

" 1. That any one knowing of the disease being concealed in an individual of any family shall immediately give information to the committee of health; and every such person so benefiting society, shall not only be rewarded, but his name shall be concealed.

" 2. That any head of a family having individuals affected with disease must not conceal it from the deputies of districts; and should the disease appear after the deputies have performed their visit, he must give information thereof to the committee of health, otherwise he shall be punished with death.

" 3. That the same punishment shall be inflicted on those who shall have the audacity to steal any article, even of the smallest value, from any house or other suspected place, which are to be considered as being under the special protection of government.

" 4. That private as well as public schools for children are forbid till further orders.

" 5. That every person is hereby specially requested to use his best endeavours to ascertain the real cause, by means of which the contagion, that afflicts this population, was introduced; being assured that any one, performing so interesting a service to the public, will not only be considered as deserving of his country and government, but, on satisfactory reports being given to the committee or to his Excellency, he shall receive the reward of a thousand scuders; and if he himself be guilty of any breach of the laws of health, or an accomplice of the delinquents, or in any way connected with them whatsoever, he shall

further receive full pardon for the crime he has committed.

" *May* 17, 1813."

In spite of these and many other rules and regulations, the disease continued to spread itself in every part of the city, attacking principally the poor, and those inhabiting small and dirty houses. The veteran soldiers, too, who were placed at the doors of the infected houses, were frequently attacked. On the 18th, there were seven people attacked. On the 19th, three attacks and eight deaths; and on the 20th, eleven attacks and ten deaths, according to the reports.

At this time certain regulations were promulgated respecting the police. Heads of families were required to affix upon their doors the names of every person contained in the house, and to cause them to appear every day for the inspection of the deputies. And in order to prevent the people from assembling in the streets, the city was divided into eight districts, each district being provided with a market for purchasing provisions. Purchasers were also required to avoid folding their commodities in paper, and invariably to pass their money through vinegar.

Although the suspension of commercial transactions at this time was operating, on the one

hand, against the spreading of the contagion, it began to operate in its favour on the other, by depriving the poor of their daily sustenance, thereby rendering them more susceptible of the disease; a calamity that seldom fails to be added to this most lamentable of human afflictions. To obviate this evil as much as possible, a liberal subscription was set on foot by the gentry, military, and merchants, for the relief of such as were found to be in distress. Thus several thousand dollars were distributed by the deputies of the several districts at the rate of about ten pence (two taris) to each individual in distress. The number relieved in Valetta amounted to about 2100, and in Floriana to about 300.

On the 22d of May, all communication between the shipping and the shore was ordered to cease at sun-set, and the Marina gate to be shut at 8 o'clock P.M.

While his Excellency the commissioner and many other individuals were thus endeavouring to the utmost of their power to arrest and impede the progress of this dreadful calamity, malevolent persons were not wanting to thwart and defeat their intentions, some asserting that the disease was not the plague, while others went so far as to insinuate that the whole was a contrivance to answer certain interested ends. In consequence,

therefore, of these and similar insinuations, his Excellency published a certificate, signed by the profession of the College of Physicians and others, specifying that the existing disease was the true plague. A reward of a thousand scudes was likewise offered by him to any one who should give information against any of these offenders.

Like time itself, that steals along in spite of every human effort to prevent its progress, so the contagion, by steady and progressive steps, continued its career.

			Attacks.	Deaths.
On the	21st	there were	5	6
	22		5	6
	23		3	4
	24		3	7
	25		4	4
	26		10	5
	27		17	5
	28		10	7
	29		12	16
	30		15	10
	31		16	10
Average from 21st to 31st,			9.5	7.4

On the 3d of June, the names of the deputies were published, in order that they might be

known to the people. They were instructed, not only to prevent communication between the different districts, but between the different families in each district. They had the power to arrest any individual who offended against their orders, and to place any house in a state of quarantine. Every species of commerce was directed to cease: carriages were to be stripped of their linings, and the infected houses were to be distinguished at night by a lanthorn hung at the doors.

On the 11th of June, another subscription was made for the purpose of purchasing new clothing for the poor, to replace that which might be required to be burnt.

The want of provisions by this time began to be felt by all classes of society, in consequence of the interrupted communication between the island and those countries from which they were previously imported. The threatened dearth, however, was timely averted by an arrangement with the Sicilian government, through the intervention of the British minister in that island. By this arrangement it was agreed, that vessels sent from Malta to a certain part of Sicily should be permitted to draw whatever provisions they required.

By the 24th of June, the disease had not only diffused itself over every part of Valetta, Floriana,

and the towns adjoining, but it had extended to many villages. All communication, therefore, between the towns and these villages was ordered to be cut off, allowing only the officers of government, and such as procured passports from government, to go through the barriers.

The disease however continued its wonted pace, and rather accelerated its steps, so that on the 29th his Excellency instituted an extraordinary commission of health, to be composed of the most able, zealous, and respectable people to be found, at which he himself presided.

The first act that proceeded from the deliberations of this body was put in force on the 3d of July, when Lieut.-Col. Rivaroli, of the Sicilian regiment, was created inspector-general of police, and invested with the power of a magistrate, independent of all others. The corps of civic guards was placed under his command, and he had the authority to call to his aid and assistance any other military force he might deem necessary.

On the 13th of this month, the communication between the different cities and suburbs was ordered to be prevented respectively, as well as between these and the rest of the country, as far as could be done compatibly with the public service, while proper barriers were established between each of these places for the purpose of transmitting provi-

sions. The number of passports was again limited; and about this time, another subscription was made for the distressed inhabitants of Valetta.

On the 17th of July, a notification was issued to prevent any individual from moving out of doors, except from six till ten o'clock in the morning, when only one person belonging to each family should be permitted to go to market.

The end of this month arrived without bringing with it any remarkable alteration for the better; the following decisive order was, therefore, published on the 1st of August.

"1. That any person changing his habitation without permission from the council of health, to whom he must first shew the approbation of the heads or deputies of the districts they leave, as well as those they wish to enter, shall be punished with death.

"2. That the same punishment shall be inflicted on any person who shall enter, without the proper permission, into any place infected or suspected, or who shall dare to leave them, or carry from them to another place any article however small.

"3. That any one who shall not reveal his complaint at the first moment, or even the slight-

est indisposition in himself or any person belonging to his family, or dependent upon him in any other way, shall suffer the like punishment of death.

" 4. That any one who does not reveal the disease or indisposition, which others go about concealing, when he shall have been convicted of having been made acquainted with it, shall be subject to the same punishment.

" 5. That the same punishment of death shall be inflicted on any one who shall conceal, being a proprietor, or steal the least susceptible article from any infected or suspected place; or who shall permit, or not prevent, if he has it in his power, such robbing or concealing in others.

" 6. That he shall be subject to the like punishment who, knowing that any one of the above articles 1, 2, and 5, have been transgressed, does not immediately disclose the circumstance to the department of health."

At the earnest request and recommendation of the council of health, his Excellency also ordered that all the inhabitants of Valetta and Floriana should retire into their respective houses, with the exception of those whom the exigencies of government might require to go out, and such as might be employed to furnish provisions, or who might

be otherwise essential to the public service. The deputies of districts were required to cause provisions to be carried to the doors of the houses.

The adoption of the same measures were likewise recommended in the other towns and villages.

On the 9th of August, the inspector-general issued certain rigorous orders for the observance of the volunteer and urban guards, respecting cleanliness; directing them at the same time to keep every house in a perfect state of quarantine.

On the 17th, a man, named Antonio Borg, was shot in the street for concealing his complaint.

On the 22d of August, it was ordered that no cotton should be gathered, but that it might be made use of as pasture while the plant was yet young; and that the punishment of death should be inflicted upon any one disobeying this order.

Towards the latter end of August the disease had very sensibly decreased in Valetta; for at the beginning of the month the deaths had amounted to about twenty-five per day, whereas now they did not exceed five or six. In Floriana it had decreased nearly in the same proportion; but it seemed rather to increase in some of the villages, particularly those of Zebbug, Bicchicara, and Curmi.

In order to extinguish, if possible, the remaining embers of the contagion in Valetta and Floriana, his Excellency, by a proclamation dated the 29th of August, cut off the communication entirely between these two places respectively, and between them and the country, not permitting even vegetables to be received at the barriers.

While the disease was gradually ceasing in Valetta and Floriana, (few being attacked besides expurgators, guards, and such as were particularly exposed to the contagion,) it still continued its depredations in the country, and particularly at the villages above mentioned. With a view to stop its progress there, his Excellency, on the 11th of September, caused a cordon of troops to be stationed around the three villages, intercepting the communication between each other at the same time.

About this period the village of Seggieni became infected for the first time, when eight or nine persons living near each other fell sacrifices to the disease.

Towards the middle of September the contagion appeared to revive in Valetta district, No. 8, where several of the guards and others were attacked. Particular attention was therefore bestowed upon this district. The progress of the contagion was attempted to be traced amongst those who became

infected, and it was explained to me in the following manner by the deputy of that district.

On the 25th of August, Andrea Xibbecas, who lived at Strada S. Giuseppe, received a will from his mother who was then infected with plague. On the following day he himself was attacked and died.

On the 6th of September, a boy named Luigi Cessal died suddenly; but no communication was traced between him and Xibbecas.

On the same day the daughter of Vincenza Psaila died suddenly. It appeared that her father, who was a butcher, had obtained permission from the deputy the preceding day to kill a pig at a caldron, situated at a place opposite Xibbecas' house, but no communication was traced between the butcher and Xibbecas.

On the following day (7th), G. B. Dofen was attacked at a house opposite to Cessal, and it was found that the former had received two eggs from the hands of the latter on the 5th.

On the 11th, the wife of Psaila, who had been ill five days, died.

On the 12th, the father of Cessal died.

On the 13th, a priest, who lived in the neighbourhood, sickened, and died on the 14th. This man had been in the habit of communicating with Cessal's family.

On the 16th, a surgeon, whose name was Madrenza, was attacked. He had visited Cessal the father professionally in the night of the 11th, which was the night previous to his death. The surgeon died on the 18th.

On the 18th also died Psaila the butcher, who had been attacked on the 10th, as did two of his sons, the one as he was going to the pest hospital.

While these cases happened, however, several others occurred within the district as well as out of it, amongst whom the contagion could not be traced at all.

Lieut.-General the Right Honorable Thomas Maitland having arrived at the latter end of September as future governor of Malta, Lieut.-General Oakes (now Sir Hildebrand Oakes) laid down his appointment by a proclamation dated the 4th of October.

The 3d garrison battalion, stationed at Floriana, in a barrack not more than a hundred paces from the military pest hospital, and not more than four or five hundred from the place where the sus-

pected articles were brought to be burnt, became again infected, after remaining free during the whole of the month of September. At the beginning of October, a woman of that corps was attacked with what was considered a simple fever, and she was permitted, in consequence of this opinion, to remain in the barracks during the first week of her illness; but as she became worse at the end of this period, she was removed to the regimental hospital, where she died on the 22d, without exhibiting any symptom of plague.

On the 16th, a soldier of this corps named Rosinsky was attacked with fever, attended with bubos and other pestilential symptoms.

A soldier, of another company, was attacked on the 20th, whose name was Frayner, in a similar manner. And on the same day a boy, named Brearton, was also found to have a large tumour under the right pectoral muscle, in the exact situation of a pestilential bubo; but as this was attended with neither fever nor pain, it was gradually resolved without his suffering any inconvenience.

On the 23d, Serjeant Draper, who belonged to a different company from any of the former, was seized with fever, bubos, and other pestilential symptoms; while, on the same day, Hall, a man belonging to the same company, was found to

have a carbuncle upon his back. This last man, having but little fever, recovered, while all the rest (except the boy) died.

On inquiry it was found that the wife of this serjeant had washed for Hall, and had kept his linen in the same drawer or box with her husband's. But she herself, although she continued to attend closely upon her husband till his death, was never infected, and she brought forth a healthy child a few days afterwards.

On or about the 23d, Samuel Ward, servant to the town-adjutant, and belonging to this regiment, was attacked with fever: but it came on one evening after much fatigue in washing the floor of his master's house without stockings or shoes, and after putting on the pantaloons, which he had washed, to dry, as is customary with soldiers. He considered the attack as a fit of the ague. A surgeon, who was sent for the next day, denominated the disease a remittent fever. On the following day several livid spots appeared upon different parts of his body, which this gentleman considered as boils. Seeing the man much worse the next day, the surgeon requested I would see him. I found him covered with pestilential carbuncles, and he died in the course of a few hours.

Although this man belonged to the garrison battalion, he had had no communication with it

for many months, further than by taking the daily report from the adjutant's orderly, by means of a pair of tongs. He lived in Valetta upon the gateway, through which all the diseased persons and suspected goods were carried from Valetta, and he was the last acknowledged case of plague that occurred in the town.

On the 19th of this month, his Excellency the Governor notified to the public, that mercantile transactions might be resumed under certain restrictions, and under the immediate observance of the council of health; and that packages would be allowed to be shipped in no other vessels than such as were bound to the Levant.

Among those attacked with plague this month, were nine sextons, seven expurgators, five guards, and four hospital servants.

At the beginning of November, they began to purify and whitewash the infected houses in Valetta with redoubled zeal, while every species of suspected furniture and clothing was consumed by fire. The expurgators and whitewashers were encamped on the outside of the walls, and whenever they made their entry into the town, they were preceded by a drum, which caused the inhabitants to retire within their respective houses, they themselves being escorted by a military guard.

On the 13th of November, a general purification was ordered to be made throughout the whole of Valetta and Floriana, when every house, magazine, ship, &c. was required to be opened and ventilated every day for the space of a fortnight. The goods contained in them were ordered to be ventilated frequently and handled by the owners. Great pains were also taken by the governor to bring to light infected goods that might be concealed. To this end, the priests and confessors were of the greatest use.

But, although Valetta, Floriana, and adjoining towns remained free from the disease, and although it had ceased in Zebbug at the latter end of November, it continued to infect the two other villages, Curmi and Bicchicara. It also re-appeared at Rabbato, and continued in it during the whole of the month of November. This place was also surrounded by a cordon, while every person attacked was immediately transported to the lazaret.

About the end of November, the disease also broke out at a place called St. George's Tower, where, in a family consisting of nine persons, seven were destroyed before the 8th of December. The father of this family, when on his death-bed, could only account for the disease by saying that he had gathered some cotton from a field of his, near Curmi, previous to the formation of the cordon; and that his wife had brought a box of fruit tied with a

cord from Rabbato, but not from an infected house.

About this time too, a woman at Nasciar, where the plague had not existed for three months, was attacked in the following manner. She was brought to bed in the beginning of December, but before she had time to recover from her indisposition, her husband compelled her to get up and wash his pantaloons. Being fatigued by the exertion, she drank a good deal of wine. This was soon followed by flooding, and that, which suddenly ceased, by a violent fever attended by a bubo in the groin, and she expired on the following day.

In this instance, the infection was accounted for in the following manner. A noted smuggler, who had been kept a long time in observation, and afterwards liberated in consequence of no marks of disease appearing upon him, had been drinking a short time before the accident with this woman's husband, when it was supposed he came in contact with the identical pantaloons the woman had washed!

But to return to the third garrison battalion which we left afflicted with plague. On the 24th of October, this regiment was removed to Fort Riccaroli, but, immediately after its arrival there, several suspicious cases occurred, such as bubos, livid sores, &c. On the 8th of November, a tailor

belonging to the regiment, whose name was Thomas Shell, was attacked with a bubo in the groin attended with violent fever, of which he died on the third day. His wife was also affected with a carbuncle on her leg, but as this was unattended with fever, she suffered but little inconvenience. Another tailor, who denied having had the least communication with the former (being of another company and working in a different part of the barracks) was attacked with fever and bubo of which he died on the 13th.

But the most remarkable case that occurred about this time was that of a Corporal Farrell, of this regiment. This man had been standing in the sea on the 10th of November upwards of an hour to wash and purify his clothes according to an order to that effect. On coming out of the water, he was seized with violent shivering and headach, succeeded by heat of skin, and afterwards by sweating, which alleviated the distressing symptoms. On the following day, the paroxysm was repeated. He was permitted to remain in the barracks from a belief that his complaint was an intermittent fever. The next day his fever returned as usual, but now it declared itself to be the plague, by a bubo arising in the groin, while the heat of the pain seemed to be transferred suddenly from the head to that part. The paroxysm was again followed by an intermission or remission, but the next morning, while

dressing himself to go to the lazaret, he dropped down and expired.

On the 29th of this month, the council of health was dissolved.

On the 4th of December, the governor issued a proclamation, of which the following is an extract.

" His Excellency feels great pleasure in declaring that the foul quarantine of the city of Valetta and Floriana having expired, the clean quarantine of these cities will commence to-morrow.

" As long as no unforeseen accident occurs, it is the intention of his Excellency to grant, at the end of forty days, free pratique to every part of the island, with the exception of those villages in which the plague may manifest itself. In consequence of which, his Excellency is pleased to order,

" 1. That the inhabitants may have the most free communication among themselves within their own districts.

" 2. After the first twenty days of the clean quarantine shall have passed over, the entire cities of Valetta and Floriana shall be liberated from every restriction, but numerous crowds shall be prevent-

ed. That, during these forty days, there shall be no pass granted to go or to return from the country, except to the inspector-general, the superintendant of the lazaret, the proto-medico, the deputy-inspector of hospitals, the agent for the prisoners of war, or such officers as may have a passport directly from Government. And all these are to consider themselves as strictly obliged to answer that they have no communication whatsoever that may endanger the public safety."

Having thus notified his intention of granting pratique to the island, his Excellency also considered it his duty also to publish an exposition, setting forth the grounds upon which he acted. The following is the substance of this exposition.

"It happens that more than forty days have now elapsed without a single case occurring of the least suspicion either of plague or of pestilential infection in the city of Valetta, and that the last case that occurred antecedent to these forty days, was seven days before that period: that Floriana has been thirty-eight days free from any case, or suspicion of plague: that Conspicua has been so from the 18th of July; Victorioso from the 20th of August. In Surglea there never happened but a single suspected case, and that was many months ago. The plague hospital in the port has been finally purified since the 18th of October. At Riccaroli,

the last case, or the last suspected to be the plague, appeared in the third garrison battalion twenty-six days ago. It is to be observed, that this regiment has been kept in a most rigorous state of quarantine, and considered as in a lazaret since the time it left Floriana forty-two days ago.

"In Zebbug, no case of plague or of pestilential infection has happened for fifty-six days; none at Bicchicara for thirty-three days; but, at Rabbato, a case occurred on the 26th ult. At Casal Curmi, cases are continually happening from time to time.

"It is also to be observed with respect to these two last villages, that they are shut up in the closest manner by a cordon of troops. Casal Curmi in particular has remained in that state for three months.

"Nor has there been an instance in which these villages have had the least communication with others, so as to endanger the health of their neighbours, neither has there been any example of any soldier forming the cordons, who has shewn the slightest suspicion of infection.

"At present the cordons drawn round the two places have been doubled with respect to the number of men, while their communication with others is completely cut off.

"It is necessary also to add, that no real case of plague has occurred from the commencement of this calamity up to the present moment on board ship; that in all the cities a complete and most perfect purification and cleansing of the goods and infected articles has taken place in every house, and an exact ventilation, purification and handling of goods has taken place in every house, shop, and magazine, and this has fortunately been completed without any case, or any suspicion of plague having happened.

"The places of divine worship have also undergone a similar purification and management under the very excellent direction of Monsignor the bishop. All the papers and documents of the public notaries, &c. have also been properly fumigated.

"*Dec. 4th*, 1813."

"*P. S.* Since this proclamation was put to press, a violent case of plague has happened in an entire family in the vicinity of St. George's Town, but it has been ascertained to a certainty that the infection arose from a communication that took place with Rabbato, previous to the formation of the cordon being established in that district. It is, moreover, to be observed, that the house in which this accident occurred, is distant and absolutely isolated, and that it has been in quarantine these thirteen days."

Another proclamation was issued on the 7th, to the following effect.

"Yesterday another pestilential case occurred at Casal Nasciar, which was found to have proceeded from a communication with the house at St. George's. It has been also discovered, that boats, either for the purpose of smuggling or refreshing, have been in the habit of frequenting St. George's Bay, when the crews occasionally disembarked, and had communication with the said house."

About the 20th of December, the town of Valetta was again thrown into the greatest state of alarm, by the occurrence of two suspected cases, both situated not far distant from the gate leading to Floriana. The one occurred in a man about forty years of age, whose skin was covered with large and diffused black spots, as if the blood had exuded into the cellular membrane. This was attended with a sense of suffocation and blackness of the face, like a person labouring under hydrothorax. The second case occurred in an infant which had a large bubo in a mature state in the groin, attended with fever and several large livid spots upon the skin, with broad inflamed margins, resembling carbuncles. But as both these recovered without communicating the disease to others, they were not held as cases of plague. On the 24th of December, however, his Excellency, the governor, issued a proclamation, stating, "that he was happy

in having it in his power to announce that the uniform opinion of all the physicians consulted by Government, was strongly in favour of its (one only being mentioned) not being a case of plague or of pestilential contagion. Notwithstanding, however, he deemed it prudent, as a measure of precaution, to order that the opening of the communication generally between Valetta and Floriana should be postponed for some days, promising, at the same time, that he would open the general communication between all the towns on both sides of the port on the first day of the new year, if no fresh ease of suspicion occurred in the mean time." He was also pleased to promulgate the following regulation, to be put in force if any other case of contagion or suspicion occurred.

(EXTRACT.)

"An appropriate proclamation shall be made by the officer of police, accompanied by a trumpet or horn through the various streets, with a view to give the people an opportunity of retiring to their respective houses. A military patrole shall also attend to enforce due obedience to such proclamation.

"While a particular investigation shall take place in order to trace the contagion, the district in which such cases shall have happened being shut up, and the sick carried to the lazaret, a free communication shall be granted in every other dis-

trict (now divided into twenty-six) and in such manner as the nature of the case may require."

On the 7th of January, the courts of judicature were re-opened.

The 14th of January being the day on which the period of clean quarantine had expired in Valetta, and the surrounding cities, these obtained free pratique at that time. It had also been the intention of the governor to have granted pratique to the whole of the country, except Casal Curmi, but unfortunately a case of rather sudden death occurred at Casal Nasciar on the day preceding; and, although the body did not exhibit any signs whatever of glandular enlargement, it was judged prudent to suspend the granting of pratique to the whole island for a few days longer. His Excellency therefore ordered that no communication between Valetta and the country should take place for the space of fifteen days.

Not trusting to the precautions that had been already adopted, and conceiving that there might have been persons who had concealed infected articles before death, that had hitherto evaded the vigilance of the police, his Excellency issued a proclamation, dated 25th of January, offering a handsome recompense to those who could give information of such concealed articles. At the same time, the bishop pronounced the punishment of

excommunication against every one who should keep infected goods in their possession without giving notice thereof to the Government.

The following proclamation was at length issued by the governor on the 27th of January.

" His Excellency the Governor is at length happy in being able to announce that the general quarantine throughout every part of the island will cease on the 29th instant; that a general pratique will then be granted, and that the communication will be established everywhere.

" In the midst of this happy occurrence, it becomes his principal duty to set forth in the most solemn manner a sentiment that ought to be universally felt, his sincere gratitude for the gracious interference of Divine Providence, for having liberated this island from the horrid calamity with which it has been so lately afflicted; a calamity whose fatal influence is generally felt to a much greater extent in other countries in which it unfortunately happens.

" His Excellency therefore orders, that Sunday next, the 29th instant, be set apart for prayer and thanksgiving to the Almighty God. On that day divine service shall be performed in the government chapel, while the bishop shall order that the necessary measures be taken for the usual performance

of a solemn Te Deum in the several churches under his particular jurisdiction.

" His Excellency moreover feels it his duty to express the high sentiments of esteem which he has for the general meritorious conduct of the public functionaries, during the whole of this period, in which they have sustained so lamentable trials. Nor can he omit to mention the great good sense and patient suffering that has characterized the people of this island, under circumstances so painful and afflicting.

" His Excellency also takes advantage of this opportunity of exercising a prerogative that has been ever nearest and dearest to the heart of his Sovereign; that is, he notifies that on the same day, necessary orders shall be given for the pardon and liberation of all the delinquents in this island, save and except those who have been condemned for murder, or for other crimes committed against society in general, so serious and black as to endanger the public safety.

" Having thus satisfied a feeling so grateful to his mind, his Excellency referring to a proclamation of the 4th ult. and acting according to the principles therein set forth, in making known to the public the grounds upon which he acts, has now to observe, that since that period, no case of plague has occurred in Valetta, Floriana, Victori-

oso, Surglea, Conspicua, Fort Riccaroli, in the port, or on board ship; neither has there been any case of plague or of pestilential infection in all the country for fifty-four days, with the exception of the lazarets, in which isolated cases are continually occurring.

"Given at our palace, La Valetta, this 27th day of January, 1814.

(Signed) F. LAING,
Principal Secretary of Government."

In this way the period of plague was terminated at Malta; nor did any other decided cases occur afterwards, except in occasional instances at Casal Curmi, which was considered as a lazaret. Shortly after this period I left the island to proceed to Sicily, my proper station; but not being permitted to land there, or to perform quarantine in that island, I was obliged to return to Malta. On my relanding, I found that the disease had broken out in Gozo, where I believe it carried off sixty or eighty persons. It was said to have been conveyed thither by a man who had dug up a box near Casal Curmi, which contained articles of wearing apparel, supposed to be infected. A man indeed did go from this neighbourhood to Gozo, and was the first in that island who fell a sacrifice to the disorder, but as to his digging up a box, this was an idle report, and could not be substantiated, as I was confidently assured from the best authority.

OBSERVATIONS.

With respect to the mode in which the plague found its way into the island of Malta in the year 1813, there are a variety of opinions; but every one of them, as far as I have heard, is founded upon the belief that it could only be communicated by actual contact either with infected persons or infected goods. Consequently, as nothing has been brought to light in proof of these conjectures, it is still almost universally believed that it was brought by some clandestine intercourse that never was revealed.

As its introduction then eluded the observance of all those who were then upon the spot, and as it shunned the vigilance of a most active government, in a situation too of all others the best calculated to favour detection, it may be considered presumption in me, who was not present at that time, to take upon me to resolve the difficulty.

But my opinions do not rest upon the evidence that, of necessity, must have been indirectly obtained. They are founded rather upon the want of evidence which the government of Malta experienced in wishing to bring the matter to light.

From the days of Hippocrates to the time of

the illustrious Sydenham and even later*, the pestilential influence was considered as capable of being conveyed through the medium of the atmosphere; but more recently, for reasons, I should suppose, more novel and convenient than demonstrative, this doctrine has been completely changed; and now, although the atmospheric influence is not denied with respect to many other diseases, as small-pox, measles, &c. it is altogether exploded as being capable of conveying the contagion of plague. Nay, to so great perfection has our knowledge of this particular contagion been reduced, that the distance of its influence has been measured, while the articles of commerce have been marked with their several degrees of susceptibility in retaining and parting with the poison†; it is lamentably proved, however, that our knowledge of these matters is still imperfect from our constant failure in the management of this contagion.

It is very remarkable that whenever a subject becomes so interesting as to draw to it the consideration of the public, if it is not already perfectly clear and comprehensible in itself, they will soon make it so: that is, if their senses cannot be brought to comprehend the subject, they will adapt the

* See Russell on the Plague, p. 261, 280, 291, and elsewhere.

† See Sir James Porter's Observations, p. 446. Muratori, lib. i. c. x. p. 84. *et aliis locis.* At Malta hot bread was held as susceptible, while cold bread was not.

subject to their senses. Hence it happens that popular opinions on abstruse matters are generally wrong, and that popular theories very frequently fail when applied to practice. From the difficulty of comprehending the Divine Being, it has been customary in every age and nation to consider him under the form of some material object, as an ox, a man, a sheep, &c. Nay, I have frequently seen the great God represented, by vulgar artists, under the figure of an ugly old man.

This mode of exemplifying instead of demonstrating appears to have been practised by the public with respect to pestilential contagion, while they have taken the subject entirely out of the hands of those whose business it is to consider it*.

The belief that the pestilential influence cannot be transported through the medium of the atmosphere, but must necessarily rest upon some material and visible object, hereafter to be communica-

* The *Bishop* and *Governor* of Marseilles published certificates in order to prove that pestilential contagion could not spread otherwise than by contact, affirming that families which shut themselves up, and monasteries that were properly secluded, escaped during the great plague which raged at that place. (Traité de la Peste, p. 150, 153.) In the *Relation Historique*, however, it is stated, contrary to these assertions, that in the *height* of the pestilence the infection penetrated into places which till then had remained inaccessible; that monasteries and houses shut up in the most exact manner were no longer places of security. (p. 169.)

ted by contact alone, appears to me to be contrary to every experience and reason. Imaginary thefts and contraband transactions give wonderful facility to modern expositors of pestilential contagion; but so many frauds as are usually required are as improbable as they are unphilosophical; for they tend to defeat scientific investigation while they fail to produce conviction themselves: but to come to the point, Why do all diseases that occur during a pestilential partake of the nature of plague? "Evenire communiter solet (pestis) quod morboso tempore nulla præter pestes ægritudo appareat. Quod si aliæ et multiplices quidem apparuerint ægritudines tunc pestilentia remittitur et cessat*." This observation appeared to me to be particularly verified at Malta during the plague of 1813. I myself saw but two cases of fever unattended with pestilential symptoms of one kind or other. One of these occurred in a woman of the 3d garrison battalion, mentioned at page 28, and the other was in a man of the 14th regiment, who died of a very anomalous kind of fever at the very termination of the season. But cases like these that are unattended with the peculiar symptoms of plague may even be of a pestilential nature, as appears by the following example related to me by Dr. Gravagni, jun. The hair-dresser of this physician was attacked with fever during the

* Ficino, cap. 4. fol. III. in principio. See also Thucydides on the War in the Morea, lib. II.

height of the plague, of which he died in the space of three days, but without exhibiting the least external symptom of plague. In a week after his death, his wife was attacked in a similar way, having no marks of plague upon her. A few days after her death, however, their child was seized with fever which was accompanied with bubos and other characteristic symptoms of the true plague. A similar instance of plague or pestilential fever occurring without external symptoms, seems to have happened in the child of Mrs. Borg, mentioned at page 8, and also in the boy named Falzon, page 11, and Grazia Pisani had been feverish a week before the glandular system became affected. These examples are sufficient to shew the folly of pronouncing these cases non-pestilential, because the peculiar characteristic symptoms happen to be wanting. The most respectable of the Maltese physicians acknowledged to me that they believed every case of fever that occurred during the season of plague was pestilential.

The general influence of the pestilential effluvium was also abundantly proved at Casal Curmi. This village, from its low and damp situation, is always unhealthy in the autumnal season, when the inhabitants become subject to intermittent and remittent fevers. This was so much the case indeed at one time that the grand-master Pinto ordered all the ovens for baking to be removed thither, from an idea that they would correct the

air. From this circumstance the village is frequently called Casal Pinto, or Casal *Fornaio*, the village of ovens. During the summer and autumn of 1813, however, it was entirely exempt from the autumnal or *mal-aria* fever, as it is called, while the plague committed the greatest devastation. "Besides the common symptoms of plague, (says Parisi) such as bubos, carbuncles, and the like, it (the pestilence) had this common character, that while it continued, no other infirmity was perceived, or if any one was attacked with another complaint it was immediately converted into this. The same thing (he adds) was observed at Trapani, my own country, in the year 1575, that for eight months successively the most vigilant physicians there were not able to distinguish any other infirmity besides the plague: and where tertians began to appear, it was an infallible sign that the plague had ceased*."

The same general influence will be seen to have operated in a striking manner in the particular cases I have mentioned at pages 29, 32, and 33. The case which occurred in the person of Samuel Ward, was a fever contracted by his imprudently putting on wet pantaloons when fatigued. The next was in the woman at Nasciar, who got up from her child-bed to wash; and in the last example,

* Cap. iii. p. 70.

the corporal brought on his fever by remaining too long in the sea. These fevers, which at another time would probably have had no uncommon symptoms, were now modified by the general pestilential influence, and converted into the true plague. The fever which the boy Falzon contracted by falling into the sea, was probably modified in the same way.

As this is an important question, I shall mention some other examples that also fell under my own observation. A Mrs. Farrel, belonging to the Royal Artillery, was seized with fever, attended with bubos and other pestilential symptoms of which she died, on or about the 1st of September. She had been attacked while living in Fort St. Elmo amidst the men of that corps, where she had been shut up from the commencement of the plague, without the possibility of communicating with any one out of the barrack. Although this woman did not communicate the disease to her husband or child, both of whom had long and intimate connexion with her up to the day of her death, there can be no question of her disease being the plague; for besides the daily paroxysm of fever, which was accompanied with delirium and very great giddiness whenever she attempted to walk, she had first a bubo of considerable size in the seat of the upper inguinal glands on the right side; and before death, a considerable en-

largement of the lower glands on the same side appeared. In short, if this woman did not die of plague, I never saw the disease.

The next case was not considered pestilential, merely from the circumstance of its not proving contagious.

About the 20th of November, a man who lived at Pictâ was loading his cart, when he received a violent blow upon his chest from a cask of coffee falling upon him, which caused a hæmorrhage from his nose and mouth. This was succeeded by a fever of a remittent kind. Being sent to see him on the 29th, I found him in the remission of fever, but he walked like a drunken man. His body was covered over with livid blotches from the size of a pin's head to that of a split pea. He had moreover a very considerable enlargement of the parotid and sub-maxillary glands. The subsequent paroxysms of fever were attended with considerable delirium till the glands suppurated, after which the fever subsided and the man recovered.

As this case, which occurred after the foul quarantine had nearly expired, as well as the two cases mentioned at page 38, which happened during the progress of the clean quarantine, would have materially influenced the granting of pratique, had they been denominated plague cases, and as none of them proved contagious, the government was

perfectly justified in denying that they were cases of plague, although in a philosophical and medical point of view, no one could justly deny that they were all modified by the general pestilential influence. I saw and heard of many other similar cases at the decline of the pestilential season.

But fever is not the only disease that seems to be influenced by this general cause. I observed, during my residence in Malta, that every whitlow festered, and every scratch became an ugly sore, although many of these were accompanied with little or no fever. A tight shoe was sufficient to produce a livid boil with symptomatic bubo. Many cases of this nature occurred in respectable individuals and staff officers, while the military hospitals were crowded with them. As an example I shall give a list of some which occurred in the 14th regiment between the 20th June and 22d October 1813.

LIST.

Name.	Disease.
1. John Jones	Eruption and tumour in the axilla.
2. Thomas Tope	Ulcer and enlarged gland.
3. Serjeant Rees	Inflammatory swelling of the thigh.
4. James Frith	Ulcer on the leg, with enlarged gland and slight fever.
5. Richard Scott	Boil, with extensive inflammation on the arm.
6. William Bales	Boil in the axilla.
7. James Grady	Boil in the axilla.
8. John Blaky	Inflammatory tumour below the knee.

Name.	Disease.
9. James Green	Ulcer on the leg, and enlarged gland.
10. James Sapwell	Boil in the axilla (livid colour)
11. William Larton	Inflammatory tumour on the inside of the arm.
12. Robert Impy	Inflammatory tumour on the foot, and enlarged gland, with slight fever.
13. William Crawley	Erysipelatous inflammation of the foot.
14. William Tope	Inflammation of the toe with enlarged gland.
15. William Aldwood	Boil in the axilla.
16. William Savage	Inflammation of the toe and enlarged gland.
17. Job King	Ulcer on the knee, with enlarged gland.
18. William Hays	Diffused inflammatory tumour of the thigh below Poupart's ligament.
19. Samuel Halfide	Inflammation of the toe, and enlarged gland.
20. James Nouch	Boil in the axilla.
21. James Wagstaff	Inflammatory tumour on the foot, and enlarged gland.
22. Corporal Bourie	Ulcer on the foot, and enlarged gland.
23. Corporal Walker	Ulcer on the leg, with enlarged glands and slight fever.
24. John Burns	Inflammatory tumour on the foot, with small ulcer and enlarged gland.
1. Lieutenant ———	
2. Lieutenant ———	Small livid ulcer at the first joint of the great toe, preceded by a vesicle, attended with enlarged gland.
3. Lieutenant ———	Slight wound of the knee, with enlarged gland.

An equal or greater proportion of similar cases occurred in the third garrison battalion, as I had an ample opportunity of observing. Mercurialis noticed the same thing in the plague of Venice,

" Quicumque (he says) tenebantur à principio tertiane, vel aliquo alio morbo, magna ex parte convertebantur eorum morbi in pestiferos: imo aliquos fuisse *vulneratos*, et *vulnera* illa conversa fuisse in pestem."

If the plague were communicated by contact alone, I would ask, why does the disease almost invariably begin at a certain season of the year? " Regnat in vere, in æstate magis, plus in autumno*." " Crescente anno (says Sydenham) adolescit, eademque vergente collabascit, donec tandem aerem in diathesin huic morbo adversantem, gracilis bruma transmutet†." There is no more contact at one season of the year than at another to account for this difference, nor can we admit that the mortality of 10,000 in one day, as happened at Rome in the reign of Titus, and at Constantinople as related by Procopius‡, was owing to any extraordinary adunation of people. " Ægyptus nostra tempestate (says Mongio) singulo triennio peste laborat, hæc neque medicamentis neque levi ingenio evitatur, sole tamen leone subeunte inclinat statim, et *nullo adjuvante* aboletur."

I do not mean to deny that contact generates the disease; on the contrary I am persuaded, that

* Ficino, cap. vi.

† Op. sec. 2. cap. ii. p. 108; see also Table No 1. of the progress of the plague at Malta and other places.

‡ De bello Persico, lib. 2.

this or vicinity, particularly if long continued, is the most certain mode of communicating it, as the history of the progress of the plague at Malta sufficiently illustrates; but I am inclined to deny that this is essential to the propagation of the contagion.

It appears to me, that this contagion or principle of plague, is diffusible in the atmosphere to a distance greater or less from an infected body, according to the climate and season of the year, and possibly to other peculiar states of the atmosphere, with which we are unacquainted: that in the spring or summer season, a single infected person is sufficient to contaminate the air of a whole city; and that those who happen to be then exposed to febrile causes, or otherwise predisposed, are the first to become its victims. That these newly infected persons generate a fresh supply of poison, increasing its strength and influence, till at length it becomes so powerful, that nothing but the winter season will entirely put a stop to it. Nor is this wide diffusibility of the pestilential poison from the body of one man, more wonderful than that of a grain of musk that will *sensibly* affect the air in a room for twenty years together, without suffering any diminution of its volume.

In this way, and in this way alone are we able to explain the first introduction of the plague into Malta, in the year 1813. From the nature of this

situation, and from the description of the people who governed and inhabited it at that period, Malta was better calculated to clear up this point than almost any other place. So active indeed was every eye, and so anxious every heart, from knowing that the plague was within the port, that it is next to an impossibility that it could have been brought in by clandestine intercourse. The crew of the infected ship was securely locked up in the lazaret; guards were placed upon the ship itself as long as it continued in the harbour, while every suspected person was seized and carried to the lazaret. But all was to no purpose. The disease seemed to laugh at their exertions, while it jumped from house to house, and from street to street. Those who had no communication together, as well as those who had, fell alike victims to its fury. Nothing could bring to light the way in which the infection was brought. Surely if any evidence had been forthcoming, it would not have been kept back when a free pardon was offered to the delinquents, besides a reward of a thousand scudes; or, if this was not sufficient, the dreadful anathemas that issued from the Church, could not have failed to produce confession. As many of the guard must have been in the secret, had any thing been taken from the ship, is it not probable that some one of these would have stepped forward to accept this reward and forgiveness? That the disease was brought in by plundering the ship, however, is rendered still less

probable, from the circumstance of nothing happening to the men who reconducted her to Alexandria, nor yet to those who took out the cargo.

It is to be remarked that the disease broke out on both sides of the lazaret nearly at the same time, and in two families that had no communication with each other; the first known case happening in a family subject to cutaneous diseases, and the other in a boy who had been scrofulous or otherwise diseased from his infancy. As I have already observed, no communication was proved between these two families, neither was any detected between these and the children of Stillini the baker, who was attacked on the 14th May.

Having failed then completely in ascertaining the source of the contagion in this way, they attempted to trace it through quite a different channel, but with equal want of success. It was discovered that Salvator Borg, who was a shoemaker, had purchased some linen to line shoes with, from a Jew, which linen had been brought from Alexandria; but on referring to the Jew, they found him in perfect health, while the linen in question had undergone the process of quarantine and purification at Zante. I mention this circumstance, principally to shew the complete failure in attempting to account for the disease by means of the ship; for, had the slightest proof been brought forward in support of these conjectures, they

would certainly not have abandoned them for the story of the linen.

Since no proof whatever then was adduced of the disease being introduced by any visible agent, it is fair at least not to deny that it came through the medium of the air, and from the bodies of those two men who died and were buried in the lazaret. This conclusion is borne out by analogy with the contagion of other diseases, as well as by the opinions of the most enlightened philosophers and physicians of ancient times, who saw more of the plague in one season than we do in an age.

As the introduction of the great plague at Messina in the year 1743 was strikingly analogous to that which I have been describing, and as the former has been frequently referred to as an example of the effects of smuggling, I shall give the result of my enquiries into the truth of the statement. The reference I allude to was taken, I think, from an anonymous writer of a letter, quoted by Russell*, which sets forth, that a fisherman, on his death-bed, confessed that he had smuggled some bales of tobacco, covered with infected canvas, and some pieces of linen, from the captain of an infected ship, on the night of his arrival in Messina, and that he had found means to convey

* Page 227.

these articles to a part of the town called Pozzillaria, where in fact the disease first appeared. Now the authority upon which this statement is made rests, as I have observed, on an anonymous writer of a letter, who was probably a mere spectator, and did it to amuse his friends, on the report of the day. But neither Turriano, who was secretary to the Senate at that time, and wrote an account of the plague two years afterwards, nor the Deputy of Health, who published another account of it, by authority, in the same year (1745), were acquainted with the circumstance. These respectable authors give the following account of the matter.

On the 20th March, 1743, a ship arrived from the Levant, on board of which three men had died during the voyage. But in consequence of the captain's misrepresentation and concealment of the fact, the ship was admitted to perform her quarantine in the harbour. Two days after her arrival, the captain was taken ill in the lazaret, and died of the plague, and his death was soon followed by that of another of the crew, from the same distemper. The same precautions had been taken, previous to their landing, as at Malta. The nature of the disease was immediately ascertained, and the bodies were buried in the lazaret with the utmost precaution. The remainder of the crew continued in good health. The ship was strictly guarded in the harbour till the expiration

of ten days, when she was taken to a distance of ten miles and burnt. The cargo, and every article belonging to the ship, as well as to the men, were consumed. These things being effected without the least apparent mischief, the people of Messina were highly delighted with their success in escaping the contagion; but forty days afterwards the disease was discovered to be in the town.

On examining two of the survivors of the crew, on oath, before the Deputation of Health, they made the following deposition respecting the communication they had with the shore while lying in quarantine.

"During the first days of quarantine, the aforesaid master gave to Camale Giulio Sangallo a canister of biscuit, covered with a napkin, which was thrown from the canister in the act of delivering it to him; in the same manner, he also gave biscuits and wine to the guards who were in charge of the said vessel*."

This then was all the communication that could be traced, according to Turriano; and the other author (whose name is not given) expressly says, "But how it (the plague) came into it (Messina) from the infected ship, it is not easy to determine, because the confusion and devastation that fol-

* Memoria Storica della peste di Messina, c. xi. p. 94.

lowed, having interrupted the inquisition which they had begun to put in force, left no means of bringing the matter to light*."

It is extremely probable, then, notwithstanding the above statement to the contrary, that the plague at Messina was introduced exactly in the same way as that at Malta, *viz.* through the medium of the air, and proceeding from the bodies of the two men who died and were buried in the lazaret. It may be observed, that the distance from the lazaret to the town is nearly equal in both cases, *i. e.* about a quarter of a mile. It has been alleged against my opinion, however, that the disease in this way must have made its appearance earlier in the town than forty days. But the argument has no weight, for the disease in all probability existed there long before it was noticed by the physicians, as, no doubt, is frequently the case. The ignorance of the Messina physicians, indeed, was abundantly proved, by their stating, at a full meeting held on the 15th May—" that, having observed the disease, and considered with every attention the essence and quality of the disease, they did not find, on any account whatever, that it was contagious and pestilential, but that they believed it to be the same epidemic as they had seen in February†." If the physicians did

* Relazione Storica della peste nel anno 1743, c. ii. p. 14.

† Memoria Storica.

not recognize the disease at this period, no wonder that they did not perceive it sooner.

It may be thought by some that I have been too minute in endeavouring to decide this question. Its importance, however, demands the utmost consideration, inasmuch as the safety and welfare of kingdoms may depend upon it. And if, after all, I am wrong in my conclusions, I am right in adopting them, since the converse cannot be proved; for had they been adopted and acted upon on the two foregoing occasions, thirty-eight thousand deaths from pestilence in the one case, and nearly six thousand in the other, would certainly have been prevented.

As relates to the past, my opinions are of little consequence,; but I mean, by pointing out the errors that have happened, to shew how they are to be avoided in future. In this way I may save the lives of thousands.

Instead, then, of voluntarily admitting ships known to be infected with plague into the very bosom of our cities, we ought to use the utmost vigilance to prevent such an occurrence: not, however, by compelling the unfortunate crew to seek refuge amongst the merciless waves, but by erecting lazarets in such situations as would not endanger the public safety. Neither does it follow, that because the founders of existing ones

were ignorant of the laws of the contagion, they should be continued in use.

I shall conclude by relating another example of the fatal effects of imprudence in the Sicilian Government. In the month of December, 1570, a ship, whose crew was infected with a pestilential disease, arrived at Siacca from Tunis, when the officers of health very properly refused her admittance. The President, Don Carlo d'Arragona, who then governed the kingdom, hearing of the circumstance, censured the officers, and ordered the ship to be received into the port of Trapani. The consequence was, as is natural to expect, the disease was communicated to the inhabitants of that town*."

* Parisi, lib. vii. c. 50.

TABLE

Showing the relative progress of the Plague during the season in Malta and other places.

Months.	Malta.	Dantzic.	Aleppo.		London.					Valetta.
	1813	1709	1761	1762	1593	1603	1625	1636	1665	1813
March					65	11	23			
April	3		384	867	138	26	85	37	2	3
May	111		777	1432	167	83	224	162	43	90
June	802	319	2330	5537	468	362	894	440	1060	472
July	1595	1313	1726	2115	2930	2999	5887	456	5667	687
August	1041	6139	476	387	2880	8919	16454	1239	18036	319
September	674	8303	403	224	2200	11904	9379	3856	31159	68
October	209	4932	438		1260	4012	1514	2686	9444	27
November	53	1961	544		710	1352	256	2592	3449	
December		584	692		290	324	37	640	734	

A CASE

OF

LOCKED JAW

CURED BY OIL OF TURPENTINE GIVEN AS A CLYSTER.

By EDWARD PHILLIPS, M.D.

COMMUNICATED BY

Dr. MERRIMAN.

Read November 8, 1814.

MISS S. æt. 20, of a very delicate and sensitive habit, and always much affected with the slightest mental irritation, was, in December last, while on a visit to her relations at Taunton, in Somersetshire, seized with a violent spasmodic affection of both legs, and a severe pain in the right side, which were supposed by her friends to have been occasioned by over exertion in dancing. As the convulsive paroxysms increased and became more general, the attendance of Dr. Kinglake was requested, and from that gentleman I have been informed that the case appeared to him to have been a decided instance of hysteric affection, of a very aggravated and protracted description; the

convulsive paroxysms were violent, recurred at short intervals, and were often of more than an hour's unremitted duration. In about a fortnight, the affection was subdued, as it was supposed, by the inspissated juice of hyoscyamus conjoined with vitriolated zinc, interposing a brisk cathartic operation every second or third day.

Miss S. soon after her recovery, returned to her family, at Charlton, near Andover, and was quite free from all the symptoms of her former attack, until July 20, when the spasms returned again with increased severity; but by the use of antispasmodics with opiates, and a strict attention to the state of the bowels, she was, in the course of three weeks, so far restored as to be able to ride out, though much debilitated, and scarcely able to put her feet on the ground.

On Monday night, August 22, I was, for the first time, requested by Mr. Poore, surgeon of this town, to see Miss S. whom I found on my arrival, in strong and general convulsions; the jaw was firmly locked, the whole of the left side paralytic, and what heightened the sufferings of our patient, and made her case peculiarly distressing, were the frequent unavailing attempts to vomit, which generally succeeded any abatement of the spasm, accompanied with a strong convulsive effort to force the irritating matter through the nostrils. Notwithstanding her sight was so much affected that

she could not discern one friend from another, there was no alteration in the pupils of the eye, and from the steadiness of the pulse it did not appear that the action of the heart and arteries were much, if at all, disturbed by so serious a struggle. Upon inquiry, I found the jaw had been closed since the morning of the preceding day, and that all the other symptoms had become progressively worse from the commencement of the trismus. Previous to her last illness a tooth had been extracted, which enabled her attendants to give her some support occasionally through a quill. The catamenia had been somewhat irregular as to the time of their appearance, but no material change was observed in the quantity or quality.

In this deplorable state, I requested she might be put into a warm bath, and remain in it for about a quarter of an hour, and an enema with sulphate of magnesia and infusion of senna, was directed to be given after she came out of the bath.

The following morning, Tuesday 23, we were informed that she felt much relieved when in the bath, and was very unwilling to be removed, though she had remained in it nearly half an hour. The spasms were not so violent, nor so frequent, and there was some mitigation of the sickness. The clyster was quickly returned, and the bowels had not been relieved. She made signs for pen, ink,

and paper, and informed us that she had an acute pain in the right side near the region of the liver, and upon examination I found that she could not bear the slightest pressure. Leeches were ordered to be applied to the side, and a draught of magnesia vitriolata in infusion of roses was directed to be given every three hours, during the absence of sickness, until a copious evacuation could be procured; the warm bath to be used again in the evening; pulse not disturbed; the jaw still firmly closed.

Wednesday morning, 24th, no material alteration of the general symptoms since yesterday, except an abatement of the pain in the side. As the motion from the bowels this morning was very inconsiderable, a powder of calomel and scammony, containing eight grains of the former and a scruple of the latter, was mixed in a little honey, and by degrees sucked through the aperture made by the extracted tooth. On calling again in the evening, we found her labouring under a convulsive paroxysm of a more serious description than any one we had before seen her in, and I proposed to my friend Mr. Poore, that blood should be taken from the arm, which was immediately done to the extent of ten ounces, and there was an obvious relief afforded by this depletion. A draught with fifty drops of laudanum was ordered to be given at bed-time, and a warm plaster to be applied to the stomach.

Thursday, 25th, our patient slept a great part of the night, and the spasms were considerably diminished both in frequency and force, yet there was a distressing return of the sickness, and not the slightest relaxation of the jaw. She informed us, by writing on a slate, that she had a violent pain in her head, and expressed a wish that leeches might be applied to the temples, which was acceded to. As the calomel and scammony had procured but a scanty stool, I ordered the same powder to be repeated, and requested that every attempt should be made to get down a little barley water and dissolved jelly. No feeling or motion in the left side, and she had not passed her urine for the last twenty-four hours.

Friday morning, 26th, the bowels had been very fully opened in the night, and she had sucked down the barley water and jelly with greater ease than she had done since the commencement of her illness. The spasms were also less frequent and severe, and there had been no return of sickness since yesterday evening, which encouraged us to hope that the disease had been partly subdued. This apparent amendment, however, was but a prelude to a return of all the symptoms in their most aggravated form, which took place about seven in the evening, when my attendance was requested with as little delay as possible. On entering the room, I found Miss S. in strong and frequent spasms; the abdominal muscles were

particularly affected, and the muscles of the face also partook of the general conflict; syncope came on, and the pulse was weak, rapid, and intermitting. The sickness returned, and was almost incessant, and tired nature seemed nearly exhausted under such accumulated sufferings.

I immediately desired that a clyster might be thrown up with some force from a syringe, composed of half an ounce of the oil of turpentine, rubbed down with the yolk of an egg, in eight ounces of infusion of senna; and as Mr. Poore arrived just as the clyster was brought, we agreed to wait and see the effect it might produce. In about five minutes after the enema was given, we were in a hurried manner called by Miss S.'s mother to go into the bed-room, and to our great joy and surprise we found our patient sitting up in the bed smiling, the jaw was completely unlocked, and she with great complacency thanked us for the great and almost instantaneous relief we had afforded her. She was able to move the left arm and leg, and there was a total subsidence of the disease and its attending bad symptoms. A glass of wine was given to her, which she drank without any difficulty. As it was late, I requested that she might be kept as quiet as possible, and her friends were prohibited from holding any unnecessary conversation with her.

Saturday, 27th, she had slept almost the whole of the night, and had taken a little toast and tea for breakfast. She was cheerful, and conversed with the greatest ease. About six in the morning she had a copious stool of healthy appearance, in which was a small worm, and this was the first that had been ever observed by her mother during the period of her daughter's life. Finding her going on so well, we declined, at present, giving medicines in any form, lest they should produce a return of the sickness; and she was directed to take mild nutritious diet, in small quantities, frequently in the day.

I now became anxious to learn from my patient some particulars of her own feelings during the operation of the clyster. It appears that almost immediately after it was given, she felt a glow of heat accompanied with a prickling sensation, first in the calfs of both legs, pursuing the course of the spine up to the neck, and afterwards to the head and face; the room then appeared to her to be full of smoke, and the jaw instantly fell. To her mother and two young ladies present there was a visible change in the countenance, which led the two latter to retire from the bed-side, under the impression that she was dying.

Sunday, 28th, I called with Mr. Poore, and found her much better in every respect, and it was agreed that a due evacuation of the bowels should

be particularly attended to. She was ordered to begin taking twice a day, a draught with the muriated tincture of iron in some bitter infusion. Under this treatment, with no variation worth mentioning, this young lady is gradually recovering her strength, and has not had the slightest return of her former complaints. She recovers the use of her legs but slowly, yet with some assistance she is able to ride out and visit her friends.

The foregoing case becomes, I conceive, both interesting and important from the sudden and simultaneous removal of a most formidable disease, attended with a train of symptoms of unusual severity and duration; and I think we may conclude from the narrative given, that this was decidedly effected by the use of the turpentine clyster.

I will not at present intrude upon the Society any hypothesis which I may have formed of the disease itself, as well as the practice so successfully adopted; but I must add, that the whole plan of treatment pursued was the result of much previous reasoning and careful deduction.

A CASE

OF AN

EXTRAORDINARY ENLARGEMENT

OF THE

SCROTUM,

WITH AN OPERATION SUCCESSFULLY PERFORMED FOR ITS REMOVAL.

By JOHN MADDOX TITLEY, M.D.

OF ST. CHRISTOPHER.

COMMUNICATED BY

THOMAS BLIZARD, Esq.

Read December 20, 1814.

THE disease which has long been familiar in Barbadoes until within a very few years, and almost exclusively confined to that island, and which has been perhaps with impropriety denominated elephantiasis, has of late spread with unexampled rapidity through the whole of the West Indies. It is more particularly prevalent amongst the Blacks, although a considerable number of the white population are sufferers from its attacks. The parts most commonly affected, are the inferior extremities, but the arms, penis, scrotum, and even the viscera are not unfrequently the seat of the disease.

The symptoms by which the elephantiasis is characterized both in its acute and chronic form, have been detailed with such great precision by various writers, that it supersedes the necessity of any further description in this place; my object being merely to relate a singular instance of this disease as occurring in the scrotum, which lately came under my observation. The enormous magnitude this part acquired, is, I believe, unprecedented in the records of medicine. It is not however merely on account of its singularity, that I have been induced to draw up the following history, but because I consider it a case of considerable practical importance: for however rare such cases may hitherto have been, they are at present by no means unfrequent, and their number seems to be increasing almost daily.

Montserrat, a negro, aged about 30, belonging to the estate of the late John Bourryau, esq. received, when a boy, a kick on the right testicle from a mule. The testicle swelled, but by the application of medicines it was soon reduced to its natural size. Some time after this, he first became subject to the rose (the name by which the elephantiasis is called throughout the islands,) which produced a permanent enlargement of both his legs. Some years elapsed before the scrotum became the seat of the disease, but from his ignorance of dates, I am only enabled to obtain the

following very imperfect history of the progress of his complaint. Five years ago the scrotum is said to have been somewhat larger than his two fists. Its increase afterwards was gradual and progressive, and did not incapacitate him from working, until within the last two years and a half. Since that time it has enlarged rapidly, and he has remained in almost total confinement, being unable to remove himself and burden from his habitation.

Although prepared by descriptions for the scene I was about to witness, yet it was not without sentiments of the most lively commiseration and astonishment, that I first viewed this singular production in October last. Language is inadequate to convey a satisfactory idea of the magnitude and appearance of this tumour, and all my efforts to procure a drawing of it proved unsuccessful.

On removing his petticoat there was exposed to view, a tumour of rather an oval form, seemingly suspended from, and greatly stretching the abdominal integuments and spermatic cords, reaching backwards to the verge of the anus, and descending to within an inch or two of the ground. It measured longitudinally from the symphysis pubis to its base 29 inches, circularly 43. The spermatic cords could be distinctly felt, somewhat enlarged, the penis was completely enveloped; the urine was discharged in a full stream and without

difficulty at an orifice situated nine inches below the pubis; on stretching this laterally, the extremity of the penis could be seen at the distance of about three inches; this canal was formed by an elongation and distention of the prepuce. The surface of the tumour was equal, smooth, with superficial veins; the superior part thinly interspersed with hair; the inferior scaly at times. The integuments felt extremely thickened, but were not of equal firmness, and retained for a time the impression of the finger. His appetite was good, his bowels regular, and his general health unimpaired. He informed me that when on his back in bed, and under the impression of lascivious ideas, he was subject to erections of the penis, at which times this member would project an inch or two at the orifice above mentioned; but that they were never terminated or attended by seminal emissions.

After carefully examining the scrotum I informed him, that in my opinion, no internal remedies or external local applications could possibly lessen or alleviate his disease; neither could any operation be performed short of removing the whole tumour, which would necessarily be attended with considerable hazard. He replied that life was become burdensome to him, that he would rather die than remain longer in his present situation, and that he was ready to submit to any

operation how great soever the risk. My friends Doctors William and Thomas Swanston, having done me the favor to visit him, and concurring in the opinion I had expressed, it was resolved that the operation should be performed; but the weather being extremely unfavorable, he was recommended to wait until it should become more cool and settled. On finding that there was a possibility of his being relieved, he became so importunate to have it done immediately, that with a view to quiet his great impatience, a large blister was applied on each side of the scrotum, and kept open by the unguent sabinæ; a seton was afterwards made in each side; but notwithstanding these discharged freely for nearly six weeks, no diminution of bulk was observable.

The weather being now mild, I performed the operation on Sunday, the 5th of December, in the presence of Doctors Swanstons and Caines, who very obligingly favoured me with their most valuable counsel and assistance. The only difficulty that seemed to occur was with regard to the possibility of saving the penis; with a view to effect this, an incision two or three inches in length was made, commencing from a little below the symphysis pubis; the penis was by this means exposed, and the extended præputium being divided, a flexible catheter was introduced into the bladder; all our effects to accomplish this having

previously failed owing to the retrocession of the penis. The spermatic vessels of each side were next laid bare and secured by temporary ligatures passed round the cords. The incision was continued backwards to the verge of the anus, and the dissection carried upwards towards the penis. The tumour being removed, the spermatic arteries were secured separately, and the upper ligature slackened, but allowed to remain in case of need. The integuments were brought together by a few stitches and strips of adhesive plaster, and were sufficient to surround the root of the penis; so that this member was the only part that remained uncovered. The hæmorrhage during the operation was inconsiderable, (except from a branch of the left pudic) the precaution being afterwards used of passing a ligature round the larger arteries previous to dividing them. My patient recovered without experiencing the most trifling unpleasant symptom. The wounds in the groins and in perinæo, were firmly united at the end of three weeks, but the penis was not completely cicatrized before the beginning of April.

On examining the tumour after its removal, the testicles were found to occupy their natural position; the left one was about the size of a hen's egg; the tunica vaginalis of the right side contained three pints of water, and the testicle was considerably diminished. The right side of the

scrotum being opened, the integuments at the upper part were about two inches, nearer the base they increased to four inches and a half in thickness; a fluid oozed from its substance, and the cavity was filled with a gelatinous matter and fluid, which also became gelatinous on cooling. The tumour weighed 70lbs. There was nothing peculiar in its structure.

Early in February, Montserrat commenced taking Fowler's solution, with a view of reducing the enlargement of his legs. This remedy was tried at the suggestion of Dr. William Swanston, in whose hands its use has been attended with considerable advantage. Arsenic has been long employed in the East Indies for the cure of elephantiasis, (vide Asiatic Researches) and Montserrat appears to have derived benefit from it. His legs are somewhat less, and he says they feel slacker and much lighter.

In similar operations if the incision be made on each side of the penis, and the skin dissected inwards, perhaps a quantity sufficient to extend round the penis may be preserved. This would greatly accelerate the cure.

Having no instances of a like operation to direct our judgment, and ignorant in what state the testicles would be found, (for the absence of emissions seemed to indicate that they had become

useless) no attempt was made to preserve them. Besides this, the thickness of that part of the integuments which must have been left as a covering, appeared to forbid the hope of their readily uniting, and the consequent inflammation and swelling of the testicles, would have added greatly to the danger of tetanus. There may be cases however of a more favourable nature, where it may be thought advisable to save these glands. I have said that these enormous swellings are now very frequent, and are becoming more so every day. I have a patient on the adjoining estate, and there are several others in the island, in whom the scrotum is from one-half to two-thirds as large as in the case above related; and there are numerous instances of enlargement and thickening of the scrotum, which are no doubt the same disease in an incipient state. When yet small, I have found setons on each side useful in reducing the swelling, but I fear such diminution will be merely temporary.

Morgagni in letter 43, article 42, quotes some observations from Waltheius, in which the scrotum and penis are described to be so tumid, that the latter extended itself down to the knees, and the former below them; the thickness of each of these parts corresponding to this length. On examination, the skin was found to be three times thicker than natural, and the weight of the tumour amounted to near 50lbs. Morgagni received the

print of a similar case from Syracuse. There is also one of 60lbs. weight spoken of in the History of the Royal Academy of Sciences of Paris, for the year 1711. As I have not an opportunity of referring to these works, I am ignorant of the particulars of the cases, and of the mode of treatment that was adopted.

Mr. Corse describes the case of Paunchoo, an inhabitant of the East Indies, in the Second Volume of the Medical and Chirurgical Transactions, (with an engraving) in whom the scrotum reached to the ankles, and was 25 inches in length, and 38 in circumference. This, as well as those related by Morgagni, are instances of the same disease; but the present is the largest, and the only case, so far as I know, in which an operation was attempted; and I trust the success which has attended its performance, may induce medical gentlemen to propose, and patients in similar circumstances to submit to, a like operation, with the well grounded hope of experiencing a happy termination.

ON THE USE OF

NICOTIANA,

IN

RETENTION OF URINE.

By HENRY EARLE, Esq.

SURGEON TO THE FOUNDLING HOSPITAL.

Read January 3, 1815.

THE following observations on an efficacious mode of relieving some of the most alarming cases of retention of urine, will not, I trust, be devoid of interest to the Society, when the frequency of the complaint, and the difficulties which occasionally occur in the treatment of it are considered.

The facts in illustration of the practice are not numerous, but sufficient to warrant my laying the subject before the public, to be confirmed or confuted by subsequent experience.

The causes of retention of urine are so various, that it is not my intention to enter at large into the subject; more especially as the plan of treatment which I shall speak of, is only applicable to

particular cases: I shall therefore confine myself to a brief consideration of the nature of such cases.

It is well known, that persons who have been long subject to strictures in the urethra, but who are still able to void their urine in a small stream, are liable, from accidental causes, to have a complete retention, and are incapable of expelling the contents of their bladder. This arises in some cases from the calibre of the urethra being still further diminished by attacks of inflammation, but more frequently from the spasmodic state of the muscles of the urethra.

The same effect may be produced in persons labouring under stricture, by retaining their urine beyond the usual period for expulsion. Even in a state of perfect health, if we suffer the bladder to be over distended, whereby the muscular fibres are stretched beyond their natural sphere of contraction, every one has experienced that a greater effort is required, and the aid of the abdominal muscles is obliged to be called in, to overcome the resistance afforded by the neck of the bladder. This, I conceive, arises from the disturbance of that nice equilibrium which naturally exists between the expelling and resisting power. When disease has existed for some time in the urethra, and a permanent obstacle is afforded to the egress of the urine, the expelling power is exerted with greater force: the bladder consequently becomes

thicker, more muscular, and contracts on a smaller quantity of fluid.

It happens not unfrequently, that the permanent stricture may be of such a nature as not to admit of the introduction of any instrument into the bladder, even under the most favourable circumstances. I need scarcely add, that a spasmodic state of the urethra would not facilitate such attempts. Other cases again occur, in which perhaps an instrument can be passed, when the urethra is in a more tranquil state, but where it would be highly injudicious, and often impracticable to introduce such instruments under circumstances of irritation, by which attempts the spasm would be increased, and the patient rendered liable to returns of retention, were we to succeed in the first instance.

In all such cases it is highly desirable to overcome the retention by other means than the introduction of instruments. For this purpose purgatives, general and local bleeding, warm baths, and tinctura ferri muriatis are commonly resorted to. With respect to purgatives, their action necessarily requires more time, than, from the urgency of the symptoms, is frequently admissible. The other remedies are highly useful, and will frequently fulfil every indication; occasionally, however, they are unavailing, and we are compelled to resort to operations for relieving the distended bladder.

In offering another powerful auxiliary to be adopted in cases which have resisted the ordinary means employed, I hope to confer some benefit on society. The medicine to which I allude is the Nicotiana, to be exhibited as an enema, in the form either of smoke or of infusion.

The powerful effect of this medicine in strangulated hernia, first led me to propose its administration in obstinate cases of retention of urine, in a paper on diseases of the urethra, which I drew up some years since for a Medical Society. I shall now proceed to relate the cases in which I have had an opportunity of ascertaining its effects.

In October, 1812, I was requested to attend Charles Wright, for a retention of urine, of which he gave the following history. When about eighteen years of age, he had suffered severely from gonorrhœa and hernia humoralis; from this period he dated the complaint in his urethra. He was now thirty-five; during this time he had been in a gentleman's service, as groom, and had been obliged to ride a great deal. The stream of water gradually diminished in size, accompanied with frequent and urgent calls, until about two years before the present period, when, from being obliged to remain a long time on horseback, he had a retention of urine, accompanied with so much inflammation, that an abscess formed in the perineum, which burst and became fistulous. For this

complaint he had been for some time under a surgeon's care, who attempted to pass bougies, but never succeeded in reaching the bladder. He had latterly been in the habit of passing a metallic bougie for himself, which was the probable cause of the present retention and inflammation.

On examination, I found a firm obscurely elastic tumour, about the size of a pigeon's egg, situated immediately on the urethra, at the lower part of the scrotum. This was about the point to which he had been accustomed to pass the instrument. The surrounding scrotum was healthy, which led me to refer the present abscess rather to the irritation of the bougie, than to any effusion of urine, which generally diffuses itself more extensively. The abscess had been about three days in forming, accompanied by great pain and fever, and he had not been able to void his urine for the last eighteen hours. I immediately made a free incision into the abscess, and let out about ℥iv. of very fetid pus. I directed him to sit in warm water, and ordered a common clyster to be thrown up. As he was still unable to make water after the trial of these means, I desired him to take fifteen drops of tinctura ferri muriatis every ten minutes, in barley water. He continued it for nearly three hours; the medicine produced nausea and headache, but still no water passed. I now attempted to introduce a bougie, but could not get beyond six inches; the introduction thus far was productive

of great pain. His symptoms were now very urgent, for although the bladder was not greatly distended, yet from the long existence of disease it had probably become much thickened, and was very irritable. Apparently no alternative now remained but an operation; and as the bladder could not be satisfactorily felt above the pubes, and the perineum was much thickened and diseased, I determined in my own mind to puncture from the rectum. Previous, however, to resorting to this *ultimum remedium*, I was desirous of trying the effect of the Nicotiana.

. . . . . .

With this view I procured some common tobacco, and not having any scales was obliged to guess at about two drachms, on which I poured a pint of boiling water. Eight ounces of the infusion were thrown up, and with some difficulty retained. After about ten minutes the patient became very faint and sick; a clammy sweat broke out over his whole body, his pulse became feeble and intermittent, and the urine began to dribble away to a considerable amount. The contents of the rectum were now suffered to come away, consisting of the infusion mixed with fæculent matter. As he still continued very faint, a small quantity of brandy was given, which quickly restored him. The effect of the Nicotiana in this instance was most decidedly beneficial, though the symptoms produced were certainly alarming, arising probably from the uncertain strength of the infusion.

I continued to attend the patient for some time; the abscess in the scrotum was unconnected with the canal of the urethra, and healed without difficulty. After some days I commenced passing bougies; at first I could not get beyond six inches, but by a few applications of the caustic, I succeeded in passing a tolerable sized one about eight inches. The fistulous opening in the perineum I laid open, and by a compress and sticking-plaster, effectually prevented the further escape of urine. He was in every respect much relieved, and there was a good prospect of his ultimate recovery, when he was obliged to leave London, and I have never since heard of him.

The next case in which I tried tobacco, occurred about three months after, in a gentleman who had been for many years subject to strictures, and for want of proper medical assistance, had suffered the disease to proceed to a most alarming extent. When he first applied to me, he declared that he had not, for a long time, been able to sleep for the space of one hour, and he was frequently obliged to make water every quarter of an hour. His general health was much impaired by want of rest, and the continual irritation under which he laboured. Generally the water came away in a fine hair stream, but at times it passed *guttatim*. On examining his urethra, I found a stricture about four inches down, which I passed with a small bougie, but could not succeed with the finest

in getting beyond six inches. After several ineffectual trials with common and catgut bougies, it became necessary to resort to the caustic. After six applications he was attacked with a retention of urine, accompanied with great pain and anxiety. All the common remedies were in turn resorted to: he was bled, clystered, placed in a warm bath, and took the tinctura ferri muriatis, but all failed in producing the desired effect. The success I had met with in the last mentioned case led me to resort again to the Nicotiana; an infusion of the strength of one drachm to eight ounces was made and thrown up. In about a quarter of an hour he became rather faint and complained of languor, and in a few minutes more the water began to flow from him. The effect of the medicine in this case was by no means so violent as in the former, but equally efficacious.

As I had evidently gained ground with the argentum nitratum, I again resorted to it, and after applying it thirty-five times, by cautious perseverance I succeeded in reaching the bladder, and freed my patient from all his sufferings. During this period he was at two several times again attacked with retention, and was relieved by the tobacco infusion, to which I at once resorted, without subjecting him to the delay of other medicines.

The third case occurred in the course of last summer: I was sent for to attend a young man

labouring under retention of urine. I found that he had been for years subject to strictures, but had always been able to void his urine until that morning, when, on rising, he was unable to discharge the contents of his bladder. He had been in the habit of passing a small whalebone bougie, which he now attempted in vain to introduce. He called on a neighbouring apothecary, who immediately attempted to pass a catheter, and used great force, which was followed by a copious flow of blood, but no urine. He was next bled from the arm, and some opening medicine was administered, and as he was still unable to make water, I was called in.

I saw him about three o'clock in the day, the retention having existed from the preceding night. He was still bleeding freely from the urethra, and had a most urgent desire to make water. I directed him to take the tinctura ferri muriatis, and to sit in a tub of warm water. He took 18 doses of the tincture without any perceptible effect but nausea. I now attempted to pass a bougie, but when about eight inches down it quitted the right tract and was readily detected, by introducing the finger per anum, passing between the bladder and the rectum. I immediately withdrew the bougie, which had caused much pain, though introduced with the utmost care and gentleness, and ordered an infusion of Nicotiana, of the strength of one drachm to eight ounces, to be used as an enema.

I was under the necessity of leaving him, to visit a patient a short distance from town, but on my return, in less than two hours, I was informed that a short time after the injection he had been very faint, and had perspired copiously, during which time the urine flowed from him in a stream.

I directed him to keep quiet, and whenever he made water to press with his hand on the perineum, to prevent, if possible, the escape of any urine by the false passage: he had no return of the retention, and by the above precaution had no effusion of urine. It is most probable that in this case the retention was kept up, and symptoms aggravated by the injudicious introduction of the catheter in the first instance, without resorting to any other means. As the urethra had been pervious to the passage of urine the preceding night, it was evident that the complaint depended on spasm, which might have been relieved by warm bathing, or the cautious introduction of a bougie. Should such a case occur to me in practice, I should be induced to try the injection of warm olive oil into the urethra, as I understand that this plan has been very successfully adopted in Italy, in cases of retention arising from spasm combined with permanent stricture.

These are the only instances in which I have had an opportunity of trying the effect of the Nicotiana in retention of urine. I have ventured to

detail the cases, as illustrative of three different causes of retention, each, however, corresponding in the impracticability of the introduction of instruments, and each having resisted the ordinary modes of relief.

The operation of Nicotiana varies much in different individuals, and is influenced in some degree by the habit of smoking or chewing tobacco. It generally acts very powerfully, and I have known it produce most alarming syncope; it ought not, therefore, to be adopted indiscriminately in slight cases, but reserved for instances where more simple means have failed. It is, probably, in consequence of the occasional violence of its action that medical men have been deterred from using it, except in cases of strangulated hernia, as I am not aware of its having been before tried in retention of urine.

Its virtues as an antispasmodic are so eminent, that I was induced to try it once in a very bad case of tetanus, in which, although it afforded a temporary alleviation from spasm, the exhibition of the enema caused so much agitation that it was not persevered in. Should such a case occur again, or should I happen to meet with a case of hydrophobia, I should be much inclined to try the effect of an extract of Nicotiana made into a suppository and placed up the rectum. This form of administering the medicine would embrace many important advantages. Its strength might be bet-

ter regulated than by an infusion or the smoke. It would produce little or no irritation; it might be easily removed if found to operate too violently; and, lastly, if its effect were salutary, it might be retained for a much greater length of time than the injection. As the case to which I have just alluded was attended with some peculiarities, the particulars of it may not be unacceptable to the Society, though unconnected with the present subject.

Case of Tetanus.

Joseph Owen lacerated his great toe with a block of wood. There was nothing remarkable in the appearance of the wound, which was granulating, when on Tuesday, Feb. 26, about three weeks from the receipt of the accident, he was seized with pain and stiffness in the muscles of his back, and was troubled with severe cramps in his legs and thighs. These symptoms rapidly increased in violence, and in a short time his jaw became affected; the muscles of the abdomen and neck afterwards partook in the affection. In a word, all the voluntary muscles were affected with tetanus. I found him in this state with a countenance expressive of the greatest terror and anxiety; his pulse was strong and full, beating about 140 in a minute, and his whole body was covered with a profuse sweat. I immediately bled him to the amount of twenty ounces, and gave him pulveris

ipecacuanhæ comp. gr. xv., calomelanos gr. v. The spasms were much relieved by the loss of blood, were less frequent, and of shorter duration. A physician who now saw him, ordered him to take large quantities of wine and sago, and to continue taking the pulv. ipec. comp. gr. v. omni bihorâ. The wine aggravated the complaint so much, that its use was soon discontinued. I now tried the enema of tobacco smoke, the result of which has been related above. Towards night the spasms were again very violent, and ten ounces more of blood were taken away, after which he appeared much easier; his pulse became softer, and he broke out into a profuse sweat; the muscles of the abdomen relaxed, and were evidently affected by respiration. The blood which had been drawn in the morning was most remarkably buffed and cupped. The following morning I found him much better, and he had slept for some hours in the night. He had not passed any fæces, and felt very desirous of easing himself, but was prevented by the spasmodic affection of the muscles whenever he exerted himself in the slightest degree. I directed him to have clysters with oleum ricini thrown up, which returned without any fæculent matter. He experienced much difficulty, and an aggravation of the spasms whenever he attempted to make water, which was small in quantity and very turbid. He was so much worse towards evening, that twenty ounces more blood were taken from his arm, which again procured him ease

and some sleep. In the course of the night he passed a fluid stool; the following morning, his pulse being still full and hard, and the spasms being occasionally violent, though much less frequent, I took twelve ounces more from him. He experienced so much ease after each bleeding, that towards evening he requested to be again bled, being persuaded that it was the only means of obtaining a quiet night; accordingly twelve more ounces were taken. He passed a tranquil night, and slept three hours at one time; early in the morning he had three copious evacuations. He was now considerably better in every respect; his pulse was much softer, and he was able to take some nourishment; his countenance was less anxious, and he no longer talked of dying. During the day he was much agitated by his relations coming to visit him, and at night it was necessary to bleed him to the amount of sixteen ounces. On Saturday morning he was much better; he had slept a great deal during the night, and was much refreshed. He said that he felt much improved, but very weak. Some arrow-root and jelly with a little wine were given to him; but the wine reproduced the spasms, so as to render it necessary again to have recourse to the lancet at night. All Sunday he was so much better that I entertained confident hopes of his surviving; the principal pain he complained of was across his back and belly, and in one thigh. On Monday he continued to improve, but unfortunately his friends paid him

another visit, and at his request gave him some porter, which reproduced the spasms, but in a much diminished degree. Towards evening he complained of weakness, his countenance had changed much during the day, his pulse became very frequent, and when sleeping he rambled a little. During the night he sunk rapidly, and the following morning expired. The blood, to the very last, exhibited the strongest marks of inflammation.

Dissection.

Nothing particular was found in the head; the veins of the pia mater were rather turgid with blood. The thoracic and abdominal viscera were healthy. On the surface of each psoas magnus muscle there was an effusion of blood, on removing which the muscular fibres were seen much lacerated and altered in texture, being quite soft and giving way under the fingers. This lacerated appearance occupied nearly the whole thickness of the muscles to some extent. A similar effusion of blood had taken place in the sheath of the right rectus abdominis, and the muscular fibres were torn and quite soft, like the muscles of an animal that had been hunted to death.

Though this case terminated fatally, I conceive that the appearance of the blood and the remission of pain on bleeding, fully warranted my pro-

secuting this plan. The muscular fibres being actually torn asunder, sufficiently prove the violence of the attack; and I think that although I was not so fortunate as to preserve his life, I rendered his severe sufferings more supportable. Blood-letting in tetanus has been much censured by different authors, but I must hesitate in subscribing to their opinions, which I conceive have been formed without sufficient trial, or rather, which have been adopted from one generation to another without the acquisition of any new facts. I am induced to form this conclusion from meeting with the following passage in Cullen. He says, "Blood has often been drawn in this disease, but it never exhibits any inflammatory crust, and all accounts seem to agree that the blood drawn seems of a looser texture than ordinary, and that it does not coagulate in the usual manner."

Now either the case which I have just related was anomalous, or Cullen has adopted opinions without sufficient grounds. As I do not possess any other facts on this head, I cannot pretend to decide on the subject, but scruple not to declare that should such a case again occur, with as much arterial action, and with such appearances of the blood, I should certainly adopt a similar line of practice, combined with the use of the Nicotiana.

CASE

OF

OBSTRUCTION

IN THE

LARGE INTESTINES,

OCCASIONED BY

A BILIARY CALCULUS OF EXTRAORDINARY SIZE.

By H. L. THOMAS, Esq. F.R.S.

Read January 31, 1815.

THE relation of the following case may be considered interesting to the Society, as it seems to point out the great uncertainty practitioners occasionally labour under in forming a correct diagnosis in cases of ileus. It will also tend to illustrate in a very extraordinary degree, the dilatable properties of the ductus choledochus communis, without being productive of any material pain in the parts immediately concerned, or any disturbance to the system at large.—On Sunday night, Nov. 20, I was called to Mrs. P. aged 63, labouring under the usual symptoms of obstructed bowels. She

had been previously attended by Dr. Bain, who had already prescribed some aperient medicine, and a purgative enema; these means not having produced the desired effect, and finding she had long been afflicted with an irreducible umbilical hernia, he directed surgical aid to be called in. At this time there was considerable tension of the whole abdomen, accompanied with pain upon pressure, more particularly felt on the left side a little above the ilium; the stomach had been extremely irritable from the commencement of the attack, but since the morning the nausea and vomiting were almost incessant; the matter ejected was in considerable quantity, and consisted principally of bile of a deep orange colour; the pulse was small and frequent; the countenance expressed great distress, and the surface of the body was universally bedewed with a cold clammy perspiration. She complained of a constant thirst, yet the tongue was moist, and free from mucus; no fæcal evacuation had taken place since Thursday, on which day she had several dark coloured copious stools, of a loose consistence, accompanied by considerable tenesmus and griping.

The hernia presented a tumour of a pyramidal shape, somewhat flattened at the apex, and of the bulk of a moderate sized melon; it was not so painful to the touch as the other parts of the abdominal parietes, and from the tenuity of the integuments the contents were readily ascertained

to consist of both omentum and intestine, in many parts firmly adherent to the inner surface of the sac. The hernia had never been reduced since its first formation, which took place suddenly fourteen years before, upon a violent effort in attempting to raise a heavy weight from the ground; there had been no perceptible increase in the size of the tumour till within the last two years, when the habit generally had become more full and corpulent in consequence of her taking less bodily exercise than what she had formerly been accustomed to. Being fully convinced that there was no possible chance of effecting a complete reduction of the contents of the hernia, and the symptoms leading me to suppose that the obstruction to the free passage of the fæces resided in the sac, I had no hesitation in proposing the usual operation for the liberation of the incarcerated parts; but as neither the mind of the patient, nor of the surrounding friends, were prepared for its immediate performance, it was deferred to an early hour on the following morning; in the mean time she was directed to take a bolus with hydargyr. submur. gr. x, to have an opiate glyster, and a fomentation of vinegar and brandy to be applied as warm as could be borne to the whole surface of the abdomen, and to be allowed occasionally a spoonful or two of cold water. The next morning I found she had passed the night in much more comfort than she had experienced the preceding day; the vomiting had ceased; the skin was warm and comfortably moist;

the thirst by no means urgent; the pulse quieter, and in every other respect she was more composed. Thus circumstanced the patient was left till the evening; the fomentation was directed to be repeated, and an emollient injection given. At ten o'clock on Monday night she appeared in every respect much relieved, suffering but little beyond the uneasiness arising from the distension of the abdomen, with a somewhat greater degree of tenderness still existing on the left side; neither fæces nor flatus had yet escaped by the anus, but the straining and tenesmus had in great measure subsided; on attending to the tumour I thought it more flaccid and yielding than on the first examination, and could for the first time indistinctly perceive a gurgling motion within, conveying an impression to the touch very dissimilar to that usually felt in strangulated hernia: thus situated, I held myself warranted in deferring the operation till some more decided change took place. The calomel bolus was repeated, and an enema with soap, was directed to be administered immediately, and in four hours repeated. The night was passed in much perturbation and distress, chiefly owing to the involuntary contractions of the abdominal muscles in their ineffectual efforts to expel the contents of the intestinal canal. About nine o'clock in the morning her torments seemed to increase with redoubled violence, when an evacuation suddenly took place, preceded by an extraordinary noise as if some solid body had been

forcibly projected from the anus; the fæces were in considerable quantities, liquid, and of a dark colour; she experienced immediate ease, and all the symptoms denoting general irritation speedily vanished. Upon the removal of the soiled linen from the bed, a hard substance, of a considerable size, was discovered in the fæces, which upon a superficial examination appeared to possess the properties common to biliary concretions; this notion was fully confirmed by the subjoined analysis, by Dr. Marcet, who, with his accustomed alacrity and zeal in the pursuit of science, readily undertook the task of ascertaining its component parts.

"It was of an oval shape, nearly regular, smooth at its surface, and of a whitish or pale yellowish colour; it weighed 228 grains, and was specifically lighter than water, as appeared from the calculus floating upon the surface of that fluid. In its longer diameter it measured 1.6 inch, and in its smaller diameter 1.1 inch, the circumference in that direction being exactly 3.3 inch. (*Vide Plate.*)

"On being cut through with a view to examine its internal structure, it appeared to consist of concentric layers or successive depositions of calculous matter of various thickness; small quantities of a dark brown, spongy, friable substance, being interposed between the strata. In their fracture the strata exhibited an appearance of radiating laminæ, like spermaceti, and the brown

matter was strewed here and there, with crystalline particles of a spermaceti-like substance. The calculus was altogether fusible by heat and combustible; when ignited it burnt with great vividness, leaving minute portions of an alkaline ash. When digested with alcohol it readily dissolved, with the exception of a little brownish matter, forming a transparent solution, which, on cooling, congealed and exhibited a congeries of crystalline transparent laminæ, which dissolved again on applying heat. A portion of the calculus being boiled in a solution of caustic potash, imparted to it a greenish colour; yet but a very minute portion of the calculous matter was dissolved in the alkaline menstruum, and on adding muriatic or nitric acid to this solution, no precipitation whatever took place. The brown interposed substance, or colouring matter of the calculus, formed but a very small proportion of the mass, and consisted probably of vitiated bile. It conveyed at first the idea of coagulated blood, but, I believe, without foundation."

That the calculus was the immediate cause of the obstruction in the bowels can hardly be doubted, and from the pain she endured in the left side of the abdomen just above the ilium, there is great reason to suppose, that the stone was for some time arrested in its progress in the sigmoid flexure of the colon, at which part the course of the intestine usually forms an angle more or less acute,

and generally is also much straightened in its diameter by the reflection of peritoneum; from this occasional formation it is, that stones of fruit, and other indigestible substances, are liable to be detained in their passage along the intestinal canal. From exposure to such causes of irritation, it happens that stricture, and schirrous indurations are more frequently detected in this part of the canal than elsewhere. That the calculus was originally formed in the gall-bladder, we have the evidence of the foregoing analysis, which satisfactorily proves its possessing the ordinary properties of biliary concretions, without the admixture of fæces or any other extraneous matter. Calculi and other concretions have been repeatedly found lodged in the intestines of different animals, particularly in the horse, which in many instances have increased to a prodigious size, without being productive of any apparent inconvenience, as these substances are usually lodged in the sacculi of the great intestine, and do not in the least interrupt the free passage of the fæces. The chemical properties of these substances, however, bear no kind of analogy to concretions formed in the gall-bladder, nor do they appear to be at all connected with hepatic affections.

In the present instance, it is perhaps much more easy to account for the obstruction which took place in the intestinal canal, than to explain the mode of expulsion of so large a body from the gall-

bladder into the duodenum, and afterwards its progress along that part of the intestine engaged in the hernial sac.

The passage of biliary concretions from the liver to the intestine, even when of a small size, is often attended with much local pain, and irritation of the system generally, and is also frequently accompanied with rigors, discoloration of the skin, and other well marked symptoms of icterus. When these distressing affections occur, are not the parts concerned more or less in a state of inflammation, or under the influence of spasm, either simply or combined? But in cases where neither of these actions is going forward, may not the ductus choledochus be considered in a passive state, admitting of an easy and gradual extension of its fibres, so as at length to allow of the free egress of the stone in question? Although there is no direct proof to bring forward in the present case in support of such a conclusion, still a number of facts might be adduced in the shape of presumptive evidence, as testimonies in its support. Many instances are recorded where the ductus choledochus has been found upon dissection considerably dilated, and in two cases under my own observation, the point of the fore-finger readily passed from the duodenum into the gall-bladder: in neither of these subjects did there appear to be any derangement in the structure of the liver, nor had the existence of gall-stones ever been sus-

pected during the patient's life-time. It is also well known, by repeated observations, that concretions of a large size, and often in considerable numbers will be found in the gall-bladder, without having been known to have occasioned any serious disturbance during life, and a stone of an irregular form has been detected firmly impacted in the duct, which had apparently been lodged there for some time without inducing either spasm or inflammation. On the other hand it must be admitted, that when the calculus is of such a magnitude and shape as entirely to prevent the free egress of the bile, a train of symptoms of the most distressing kind will most probably ensue, and terminate in suppuration; when if the abscess fortunately points outwardly, it now and then happens that the stone shall escape by an external opening, and the patient after long protracted sufferings shall ultimately recover. The venerable Heberden has noticed an instance of such a termination, and another interesting case of the same kind is given by Mr. Blagden in the 5th volume of the Medical Transactions of the College.

It may be proper to notice, that Mrs. P. was a woman of regular habits, and of a placid, quiet disposition, had uniformly enjoyed most excellent health, and had never shewn any symptoms of jaundice. She was now and then subject to slight attacks of dyspepsia, accompanied by acid eructations, but she was generally able to account for

the presence of these affections from some irregularity in diet. Ten days after the expulsion of the calculus, I found her complaining of pain in the epigastric region, with the eyes and skin evidently tinged of a yellow colour; upon farther enquiry, the fæces were ascertained to be nearly white, and the urine much loaded with bile: these symptoms speedily disappeared upon taking a few doses of magnesia and rhubarb; strict attention was paid to the examination of the fæces, they gradually regained the natural colour, but nothing like gallstones was ever observed.

A CASE

OF

INCONTINENCE OF URINE,

OF

NINE YEARS' DURATION,

CURED BY EXTERNAL PRESSURE.

By JOHN HYSLOP, Esq.

Read July 18, 1815.

THE patient was a young gentleman of 18 years of age, who had been subject to incontinence of urine for nine years, during which time he never passed a single day, without several involuntary discharges of his urine, and even during the night the same unfortunate and involuntary evacuation constantly took place.

In consequence of this, his life became truly uncomfortable. He had to submit to pain from inflammation coming on in the neighbouring parts, and from consequent excoriations; and he suffered much from the disagreeable urinary effluvia which constantly passed by evaporation from his clothes and from his bed.

But that was not all the evil which arose from

this distressing state. He had to bear up in his mind under shame and vexation; the trying to hide what could not be concealed, gave him unavailing anxiety; and the sneers of his playfellows and of servants, were, he has often told me, almost insupportable. He was even refused admission into boarding-schools; and a shyness of manners, with a wish for solitude and retirement, gradually came on, and most likely had entirely changed, or greatly subdued the energy of his mind.

Many physicians and surgeons had been consulted, and various were the means employed. Tonics, cold bathing, blisters at one time to the sacrum, and at another to the perinæum, had been applied, and opiates, with a view to break in upon a habit which by degrees had become established, were fairly and freely tried, but without any success.

He was sent to London to be under my care, and as I could have him in my house, so as to be constantly near him, I determined to employ pressure. The jugum penis did not answer the purpose, because it strangulated the glans so much that it could not be endured for the necessary length of time. I was, therefore, obliged to have recourse to some invention of my own, and it consisted of the following simple apparatus.

I selected a bougie of a size large enough to fill his urethra, from which I cut about two and a half, or three inches. Having placed that on the outside of the under part of the penis on a line parallel to the canal, with its point projecting a short way beyond the glans to avoid as much as possible any pain from pressure, I passed straps of adhesive plaister around, (first at the point of the penis, and afterwards continuing strap after strap the length of the piece of bougie,) and pulled them so tight as to press the bougie close in upon the urethra, so that no space was left by which urine could pass.

This was done at ten o'clock at night, and at three o'clock he called me out of bed, having a great desire to pass urine. I removed the straps, &c. and when he had emptied his bladder, I applied others in the same manner. The next desire for this evacuation was about seven o'clock, and the next again at eleven o'clock in the forenoon. After each evacuation the pressure was renewed without any unpleasant symptom, and in three days he was cured of incontinence of urine.

How far such treatment might answer the purpose of cleanliness and convenience, in paralysis, I have as yet had no experience, but when a case of that kind comes under my care, I shall not hesitate in giving it a trial.

A CASE

OF

ANEURISM BY ANASTOMOSIS

IN THE LEFT ORBIT,

CURED BY

TYING THE COMMON TRUNK OF THE LEFT CAROTID ARTERY.

By WILLIAM DALRYMPLE,

SURGEON TO THE NORFOLK AND NORWICH HOSPITAL, AND TO THE NORFOLK LUNATIC ASYLUM.

COMMUNICATED BY

ASTLEY COOPER, Esq.

Read May 23, 1815.

ON the 24th of November, 1812, Dinah Field, aged 44 years, of a delicate and sickly habit of body, came to me with a complaint in the left eye. She said, that about five months since, being then pregnant of her sixth child, she was seized in the middle of the night, with an intense pain in the left eye-ball, accompanied by a whizzing noise in her head, which grievously distressed her. "The attack was sudden, instantaneous." That, "hearing a noise as of the cracking of a whip, and feeling at the same moment an extraordinary kind of pain in the globe of the left eye, she awoke in great alarm, and leaped out of bed." About ten or twelve hours afterwards the eye became infla-

med, and the eyelids so much swelled, as to project considerably beyond the level of the upper and lower orbitary ridges. She also felt acute pain over the whole of the left side of the head; and in the left eyebrow, and at the bottom of the orbit, her anguish was scarcely to be borne. In the succeeding night the extreme violence of the pain abated, but the swelling of the eyelids seemed rather to increase; and she thought she felt as if "the globe of the eye was forcibly driven upwards towards her forehead." No particular alteration took place in the next seven weeks, at the end of which she was delivered.

During her labour, which she said was very severe, there was projected between the eyelids a bright red tumour of an oblong form, which for seven or eight days gradually enlarged, until it occupied, in a vertical direction, almost the whole space between the superciliary ridge and the lower edge of the ala nasi; reaching horizontally from the external angle of the left eye, across the root of the nose, to nearly the internal canthus of the right eye. In the course of her confinement, this tumour was punctured in several places by a surgeon who then attended her. It bled freely, became smaller, and of "a strikingly darker colour." A week afterwards it was again punctured, and with similar results; and although the operation was repeated four other times, the latter incisions afforded no relief.

About two months previous to the appearance of this swelling, the patient lost all power over the levator muscle of the superior palpebra: but if the swelling was depressed and the upper eyelid raised, she said she could see as well as ever. She soon afterwards became totally blind on this side.

Such was her case, and such her appearance, when I first saw her on the 24th of November. She was then only a week under my care, and ceased to be so from the end of November till the middle of March, a period of three or four months. When she again became my patient her general health had sensibly declined; and her condition was very wretched. The local affection was also marked by very decided characters. It was distinctly ANEURISMAL. Her pain was constant and acute, and chiefly referred to the bottom of the orbit; but her severest suffering was occasioned by an unceasing noise in her head, which she compared to the "rippling of water," and said, "that it became absolutely insupportable whenever by any accident her head fell below a certain level."

The left eyeball was immoveable; and either enlarged, or thrust with so much force against the upper eyelid, as to cause this part to project in a convex form, considerably beyond the superciliary and infra-orbitary ridges. The eyebrow also of the affected side rose somewhat above the range

of that of the opposite side. The external surface of the tumid eyelid was for the most part soft and elastic to the touch, but its cuticle was remarkably coarse, as was, indeed, the texture of the skin generally in the vicinity of the orbit. Deep seated between the integuments of the eyelid, a little towards the inner canthus of the eye, there was a cluster of small tumours of a firm and dense structure, causing great pain when compressed, and communicating to the finger a pulsatory thrill. Interposed between this cluster and the lower edge of the eyebrow, precisely in the course of the frontal branch of the ophthalmic artery, there was a hard tubercular substance, which rose somewhat higher above the general surface of the eyelid, and pulsated still more distinctly than the smaller swellings. The texture of this substance was particularly hard and compact, the slightest pressure upon it occasioned intolerable pain. The lower eyelid was averted, and formed a bright red convex tumour, following, in its outline, the direction of the inferior edge of the orbit, and reaching from the external commissure of the eyelids a little way beyond the tendon of the orbicularis muscle. At its upper part it was covered by an over-lapping of the upper eyelid, which was paralytic, and entirely concealed the globe of the eye. The most depending point of this tumour reached to within a line of the sub-orbitar foramen. Like the tumours at the upper part of the orbit, this swelling communi-

cated to the touch an aneurismal thrill, which also became evident to the sight whenever the force of the circulation was increased. In addition to these appearances, immediately above the nasal third part of the superciliary ridge, the integuments were gently elevated into a soft ill defined tumour, occupying very exactly the situation of certain branches of the frontal artery, and pulsating simultaneously with the artery at the wrist. A similar elevation of the skin was perceptible at the root of the nose, giving a faint tremulous motion to a finger placed upon it. When the globe of the eye was uncovered, it appeared, at first, to be enlarged, but a closer inspection shewed it to be forcibly thrust forwards, in a direction somewhat outwards and upwards towards the root of the orbit. A multitude of enlarged vessels might be traced from the surface of the lower tumour to that portion of the conjunctiva which covers the sclerotic coat of the eye. The cornea retained its natural lustre and transparency, but there was a total loss of power in the fibres of the iris; and the pupil, which was much dilated, had a slightly irregular figure. Behind the lens a fawn-coloured appearance was observed, similar to that which is represented in the second plate of the posthumous work of that admirable observer, Mr. Saunders. The cutaneous veins of the face generally were very full of blood, and gave to the skin of the whole of this side of the face, the complexion of a person strangled. When strong pressure was made

upon the common carotid artery, the tremulous motions of the tumour situated at the lower part of the orbit ceased entirely, but the pulsations of the upper swellings continued in some degree. The force of the stroke was, indeed, much weakened, but no pressure which the patient was able to bear could entirely suppress it.

Such is the exact description of this interesting case when it came a second time under my examination, and I could not fail to perceive in it the characters of that particular affection of arteries which, with perhaps a doubtful propriety, has been called "Aneurism by Anastomosis," as well as the closest resemblance to the case, which, with a master hand, has been described by Mr. Travers in the second volume of Medico Chirurgical Transactions*.

At noon, therefore, on the 7th of April, 1818, I tied the common trunk of the left carotid artery, in the presence of Dr. Wright, the late Dr. Reeve, Mr. Stevenson, and some other gentlemen.

The operation was performed after the manner adopted by Mr. Astley Cooper, in the case of

* It would be difficult for me to over-state the assistance which I derived, in this case, from the excellent paper above mentioned: and I eagerly embrace this opportunity of acknowledging an obligation, the value of which can be appreciated only by those who may have been placed in situations of similar responsibility.

Humphrey Humphreys, with a single deviation*; and its course was marked by the same circumstances which attended the operation of my distinguished friend. As soon as the margin of the mastoïd muscle was raised, the descending nerve of the ninth pair was exposed to view, and when the sheath of the artery was laid open, the par vagum was seen at the outer side of the vessel. The jugular vein, pushed by the fore-finger of the left hand beneath the edge of the mastoïd muscle, afforded no embarrassment. Nothing but the bare artery was included between the ligatures, which were formed of a small, but very strong *round* twine, and placed at the distance of about an inch and a quarter from each other. They were tied very firmly around the trunk of the artery, which was divided in the interspace, at the distance of about two thirds of an inch from the lower thread. The edges of the wound were brought together by the common adhesive strapping; and the end of one of the ligatures was marked for the sake of subsequent observation.

The effects of the operation were immediate and decisive. As soon as the ligatures were tied, the pulsatory motions of the tumours on the forehead and cheek entirely ceased; but a slight thrilling was still perceptible in the tumid upper eye-

* This deviation consisted in omitting to pass the needle and thread through the artery, above one ligature and below the other.

lid. The red swelling of the lower eye-lid became paler, and its surface shrivelled. A few minutes after the patient was placed in bed, she was quite free from pain, and the noise by which she had been so long tormented having now also ceased, she declared to Mr. Stevenson, that "her head no longer felt like her old head."

At 5, *p. m.* there was no pulsation in any of the tumours. She had suffered a good deal of heavy pain at the hinder part of the head, but that had subsided, and she was calm and clear.—Pulse 102.

9, *p. m.* Some stiffness and difficulty in the act of swallowing, with restlessness and anxiety.—Pulse 104.

8th, April 7, *a. m.* Had passed a tranquil night, though with very little sleep.—Pulse 100 and soft.

1, *p. m.* Calm and easy, intellect perfectly clear. The upper eye-lid, for the first time during several months, was moveable.

9th, April 7, *a. m.* Had passed a good night with much refreshing sleep. Pulse 100 and soft. The tumour over the inner part of the eye-brow entirely gone. The swelling of the upper eye-lid was much smaller, its texture much softer, and it was less painful when compressed. The globe of the eye was also considerably retired within its orbit.

At the wound all was quiet, but there was much difficulty in swallowing.

10 *p. m.* Had passed a tranquil day, and was very cheerful.

10th April, 7 *a. m.* An excellent night. Pulse 98.

1, *p. m.* Bowels relieved. Pulse 96.

11th and 12th April. Two excellent days and nights. Pulse 84 and 80.

13th April, 10 *a. m.* Had passed an indifferent night, and was very unwell. The first dressings removed. The edges of the wound had united throughout their whole extent, except the extreme points where the ligatures were placed.

2, *p. m.* Two hours ago had a smart rigor, and was now become hot and thirsty.

9, *p. m.* Fever fit subsided. Pulse 90 and soft.

14th April, 6 *a. m.* An easy night, with much refreshing sleep.

2, *p. m.* She was very unwell, complaining much with a good deal of general commotion in the system. Pulse 112 and hard. Sixteen ounces of

blood were taken from the arm, and a purging mixture ordered.

5, *p. m.* Had been purged twice, and was now cool and easy. Pulse 90, soft and flowing.

15th April, 8, *a. m.* Quite at ease. Great changes have taken place in the tumours. The globe of the eye was completely retired within its orbit, and the general prominence of the upper eye-lid had sunk proportionably. Not the slightest pulsatory or thrilling motions were perceptible in any of the diseased parts.

15th, 16th, and 17th of April. Prosperous days. On the last day the patient got out of bed, for the first time.

18th April. The upper ligature came away upon the dressings this morning, being the eleventh since the operation.

From the 21st of April to the 3d of May, daily improving in health and strength.

4th May. During the last three or four days, the lower ligature had been gradually rising to the surface, and to day it came away, followed by a large discharge, but unaccompanied by the slough of the artery.

7th May. Within the last two days loose, luxuriant granulations had arisen at the extremities of the wound where the ligatures were inserted. These were treated with the nitrate of silver, but their growth was restrained with difficulty; and the quantity of matter was too large.

10th May. A smart fever fit to day, with pain and tension, and redness of the skin along the edges of the cicatrix.

12th May. A sinus had formed, and a considerable discharge of pus took place at the lower opening.

17th May. The loose spongy granulations having subsided, and the wound being nearly healed, the patient was this morning allowed to return to her family. From this period to the 3d of July, nothing material occurred. The tumours had all disappeared, and the patient's general health seemed re-established; yet the wound was not entirely closed. Pale, flabby granulations daily arose at the points where the ligatures were placed on the artery, and several small sinuses, forming in slow succession, occasioned much trouble. At length, on the evening of the 3d of July, I was called in great haste, in consequence of a bleeding which had taken place at the lower part of the wound. I went instantly; but the hæmorrhage had ceased before I could reach the house. The colour of the

blood was florid, the quantity lost computed at ten or twelve ounces. This accident distressed me greatly, and produced so much commotion in the system of my poor patient, that the spongy substance which surrounded the little opening whence the blood had flowed, was forcibly propelled from the wound by every stroke of the heart.

A similar discharge took place on the evening of the 9th of July, which, like the former, ceased spontaneously; and happily proved the last of a series of incidents not unlikely to disappoint the hopes which the earlier circumstances of the case had inspired. From this period, however, the course of events was prosperous; and on the 19th of July, which, reckoning from the morning of the operation, comprizes a period of 103 days, the wound was firmly healed, and the patient's recovery secured. Of her present state it only remains for me to observe, that, after a lapse of nearly two years, her cure appears complete, with the exception of her sight, which seems irrecoverably lost. Nor can I, at this period, entertain a fear of a recurrence of the disease, notwithstanding the apprehensions which, in reference to cases of this kind, have been felt and expressed by a great master of our art.

With respect to the state of the local circulation, as far as it can be known, there is no pulsation to be felt in any of the branches of the tem-

poral and facial arteries on the side on which the ligature was tied. But, as in the case treated by Mr. Travers, "the artery may be distinguished beating very feebly below the angle of the jaw;" and a very brisk action of collateral branches, lying near the surface, is visible in the vicinity, and along the course of the cicatrix.

Norwich, Feb. 1, 1815.

ACCOUNT

OF

A CASE

IN WHICH

PARTS OF A FŒTUS

WERE FOUND IN A TUMOUR SITUATED IN THE

ABDOMEN OF A GIRL

TWO YEARS AND A HALF OLD.

COMMUNICATED IN A LETTER FROM

EDWARD PHILLIPS, M.D.

OF ANDOVER,

TO

B. C. BRODIE, Esq.

Read July 18, 1815.

MY DEAR SIR,

IN compliance with your request, I send you a brief account of the case which I mentioned to you lately; and of the appearances on dissection, of which you are at liberty to make what use you think proper.

A girl two years and a half old was brought to me for advice, in December last. Her mother informed me, that the child was born apparently healthy; but that in the third month she noticed an enlargement of the abdomen, which gradually

increased without affecting the child's health or spirits. Two months previous to my seeing her, she had been attacked by frequent and distressing vomiting. She became emaciated, and the abdomen increased more rapidly in size. She lost her appetite, and suffered much from pain, particularly when placed in the erect posture. Towards the conclusion of the disease, she was obliged to be always kept in the horizontal position. The mother had been informed that the child was dropsical, and aperient medicines had been ordered from time to time, without diminishing the size of the abdomen, or allaying the pain and sickness.

On examination, I found a hard regular tumour, situated on the left side of the abdomen, which at first I thought to indicate a disease of the spleen: but on further inspection, I was led to alter this opinion, and became perfectly at a loss to explain the nature of the case. The superficial veins of the belly were much distended, as they are generally in dropsy; but no fluctuation could be perceived; the breathing was not disturbed; and the secretion of urine was undiminished.

The child was obviously sinking under the disease; and I therefore gave the mother no hopes of her recovery, and simply prescribed some laxative powders, and the occasional use of clysters for the purpose of keeping open the bowels, which were in a torpid state. Three days afterwards I

found all the symptoms greatly aggravated, and on the following day the child died.

I prevailed on the parents to allow the body to be examined; and the dissection was made by my friend Mr. Pitman, nine hours after death.

On opening the abdomen a large tumour presented itself, occupying almost the whole of the left hypochondrium, and extending from the edge of the diaphragm nearly to the pelvis. The tumour was easily to be separated from the surrounding parts, with the exception of the left kidney, to which it was attached by a substance almost ligamentous.

The liver bore marks of inflammation, and was studded with tubercles. The other abdominal viscera were healthy.

The tumour, when removed from the body, might have weighed about eight or ten pounds. It was of an oblong shape, loosely covered by a delicate membrane highly vascular. On making a section of it, some ounces of a limpid fluid escaped from a cavity, the parietes of which were nearly cartilaginous; and in prosecuting the dissection, several similar compartments were discovered, all of which contained fluid or sanious matter.

In the further examination of this fleshy mass,

our attention was arrested by the resistance which the knife met with; and which led to the discovery of the bones which I have sent you. They were connected to the internal substance of the tumour by a structure decidedly muscular. The large bone, resembling the tibia, was covered by muscle; the small bones, resembling those of the tarsus, were connected to the tibia by soft cartilaginous bands.

From circumstances which it is unnecessary to explain, it happened that the dissection was conducted under peculiar difficulties, which prevented the examination of the body from being so minute as we wished it to be. But brief as the relation is, I conceived that it may be of some value to the physiologist, as it appears to furnish an additional instance of one fœtus being contained within another.

I am,

Dear Sir,

Yours, &c.

EDWARD PHILLIPS.

Andover, Hants, June 26, 1815.

N. B. The bones referred to in this letter, are preserved in Mr. Bell's Museum in Windmill Street.

A CASE

OF

AXILLARY ANEURISM,

FOR WHICH THE ARTERY WAS TIED BELOW THE CLAVICLE.

By RICHARD CHAMBERLAINE, Esq. Jun.

MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN LONDON, &c.

COMMUNICATED BY

JOHN ABERNETHY, Esq.

Read June 20, 1815.

A MUSCULAR and healthy looking negro-man, about twenty-five years of age, (belonging to James Farquharson, Esq. of Job's Hill, in the parish of Saint Mary) was sent to Kingston on account of an aneurism in the left axilla, occasioned by a wound which he received from the point of a cutlass in the axillary artery, as he was carelessly carrying it, on or about the 5th of October, 1814. The hæmorrhage from it was, as I was informed, profuse, and ceased in consequence of long continued syncope. The wound of the skin healed in three days without any recurrence of the bleeding.

It was nearly nine weeks after the accident when he was first shewn to me. The cicatrix was scarcely perceptible. The tumour was the size of a large orange; and the pulsation in it very strong. The pain in the axilla from the pressure on the nerves was very distressing, but there was no œdema of the arm, nor any elevation of the clavicle. The pulsation in the radial artery was not so firm as in the other arm. He remained two weeks in town, during which time I had frequent opportunities of seeing him, and the tumour appeared to me to be evidently increasing, was pushing out the latissimus dorsi, and shewing itself behind. At this period he went into the country to visit his relatives, and returned to town in ten or twelve days after, January 10th: the tumour had now considerably increased, and become much firmer, for when I first saw him I could express the blood from the prominent part, which was in front of the axilla. The pulsation in the radial artery was becoming indistinct, and the pain in the axilla so severe as to deprive him of rest both night and day. The integuments over and about the aneurism were perfectly healthy in appearance. Upon a review of all the circumstances attendant on this case, it occurred to me that the operation was the only possible means that remained to rescue him from inevitable death, and that much danger was to be apprehended from a further postponement of it. Under these impressions, it was undertaken on Tuesday, 17th January, 1815, in the presence of

Mr. Garcia and Mr. M. Bravo, surgeons in this city. The patient was placed upon an operating table, with a pillow under his shoulders, and his head supported. A transverse incision of three inches in length was made through the skin and platysma myoides along and upon the lower edge of the clavicle, three fingers' breadth from the sternal extremity of that bone, and terminating about an inch from the acromion scapulæ. This incision divided a small artery, which was immediately secured. A second incision of three inches in length was also made obliquely through the integuments over the deltoid and pectoral muscles, meeting the first nearly in the centre. The cellular membrane and fat lying between them at the upper part were now removed. The next step in the operation consisted in detaching the clavicular portion of the pectoralis major, and taking away the fat and cellular membrane lying over the subclavian vessels. The artery was now brought into view, and its pulsations made it clearly distinguishable from the contiguous parts; but I could not detach it, nor pass the ligature underneath it with the facility I expected, from its depth. After several ineffectual efforts, I succeeded in conveying the ligature under it, by means of an eyed ball probe previously curved for the purpose, and bringing up its point with a pair of forceps, tied the artery as it emerges from under the clavicle to proceed to the axilla. The drawing of the knot was attended with little pain;

the wound was closed by the dry suture, and the patient returned to his bed.

Evening visit after the operation.—Pulse natural; skin cool; affected arm appears much warmer than the other; complains of pain in the wound.

Jan. 18.—Patient had no sleep all night from pain in the wound; temperature of the arms alike; aneurismal tumour appears less; pulse natural; skin cool; tongue clean and moist.

6 *p. m.*—Patient had no sleep in the forenoon from pain in the wound; complains of headache; an antimonial opiate ordered for him.

Jan. 19.—The patient had some rest during the night; pulse full and natural; tongue white; complains of headache; affected arm appears much warmer; tumour softer; feels no pain in the axilla since the operation; a purging mixture was ordered for him.

2 *p. m.*—The dressings were removed; wound has a favourable appearance; has had three stools from the mixture; tongue clean and moist; pulse regular; has also had some sleep during the forenoon; tumour evidently less in bulk.

Half past 6 *p. m.*—The patient slept after the wound was dressed; complains of having no feel-

ing in his fingers, and a gnawing in the wound; pulse fuller, yet regular; bowels open; opiate repeated.

Jan. 20.—The patient passed a good night; the affected arm appears much warmer than the other, and is covered with perspiration; feels no pain in the wound; pulse regular and soft; skin and tongue as before; and complains only of inability to bend the fingers; opiate continued.

Jan. 21.—Temperature of the arms corresponds; passed a good night; and is much the same in other respects as yesterday.

Jan. 22.—The dressings were removed again this day; the wound is filling up with healthy granulations; patient passed a good night, and says he feels no pain in the wound or in the axilla; opiate continued.

Jan. 23.—Tumour appears considerably less to-day; arms are the same in temperature; slept well last night; pulse natural; bowels regular; opiate continued.

Jan. 24.—The dressings were removed again to day, and the wound is covered with healthy granulations; patient passed a good night; other symptoms and appearances the same as yesterday; opiate continued.

Jan. 25.—The patient sat up the most part of the day, and appeared more cheerful than at any period since I saw him; arms continue to correspond in temperature; in other respects he is the same as yesterday; opiate continued.

Jan. 26.—Going on well; discontinued the opiate.

Jan. 27.—The wound was dressed again to day, looks well, and is cicatrizing from the edges; the arm is much weaker than the other, and cannot grasp firmly with it; tumour considerably smaller, and does not project behind.

Jan. 30.—Ligature came away spontaneously, and was found in the dressings. The granulations having risen much above the surface, the sulphat of copper was applied to them; temperature of the arms alike; the patient got out of his bed and walked about.

February 22.—The wound healed this day; the aneurismal tumour is now nearly as large as a turkey's egg, and very solid, but no pain is felt when it is roughly handled. Upon comparing the arms the left is rather smaller; the muscular power of the arm is much improved, inasmuch as he now grasps with a greater degree of firmness and strength; temperature of the arms is the same; discontinued to visit him.—N.B. The temperature of the axilla was always ascertained by a well graduated thermometer.

As I am not aware that the subclavian artery has ever been tied below the clavicle by any regular chirurgical dissection, I hope I shall be excused for having described the method I adopted in the present instance in so particular a manner. Passing the ligature beneath the artery constitutes the chief difficulty in the operation either above or below the clavicle; but this is completely overcome, I conceive, by the surgeon being provided with the instruments represented in Mr. Ramsden's book on Sclerocele and on Aneurism. These I had not, nor could they be procured here, the want of which was therefore the cause of much delay in the performance of the operation; together with the want of resolution in the patient, who made several attempts to extricate himself from me whilst I was endeavouring to convey the ligature underneath the artery. The incision over the pectoral and deltoid muscles greatly facilitated the tracing of the subclavian artery. This case affords, I think, a striking example of the competency of the anastomosing channels to nourish the limb when its principal artery has been obliterated at nearly the highest possible point that dissection can reach it, and that too, at an early period of the disease.

Kingston, Jamaica,
12th March, 1815.

SUCCESSFUL TREATMENT

OF A

CASE

OF

CYNANCHE LARYNGEA.

BY JAMES WATSON ROBERTS, M. D.

OF BISHOP STORTFORD.

COMMUNICATED BY

DR. BAILLIE.

Read November 8th, 1814.

ABOUT three o'clock in the morning of the 19th July, 1794, I was called, by his particular desire, to attend Dr. J. M. H. a physician of considerable experience, 46 years of age. I found him in bed, surrounded by the physicians and apothecaries of the army commanded by the Earl of Moira, then encamped near Southampton. His face appeared very much swollen, and redder than usual. His eyes were protruding and bloodshot: there was a fulness about the neck, the muscles feeling very turgid, and the breast was suffused with a purplish

colour, such as I have frequently seen in the earlier stage of the Yellow Fever, in plethoric habits. There was no increased erubescence in the fauces, nor any enlargement of the tonsils; and no great difficulty in deglutition. When questioned with regard to the seat of his complaint, he pointed to the pomum Adami, and cried, "There." The skin was very dry, and its heat was considerably above the natural standard. The pulse was 112 in the minute, remarkably full, strong, and laborious; and the carotid arteries pulsated very forcibly and visibly. His voice was hoarse, as from a common catarrh, but he had no cough; the dyspnœa was not constant, nor was there any symptom present which indicated inflammation of the lungs. He had great somnolency; so that he would attempt to sleep (which he never could do for above a minute at a time), even while the by-standers were interrogating him concerning his disorder. As soon as he had closed his eyes, he began to snore; when his face was instantly covered with a crimson suffusion; and he awoke seemingly in a fright, gasping for breath, and casting both arms out of bed, with the palms extended towards us, looking most anxiously for assistance, being unable to utter a word.

In this most painful struggle, which threatened immediate extinction of life by suffocation, one of the physicians had very happily devised the administration of oxygen gas, the inhalation of which

instantaneously gave relief, and respiration was restored.

These paroxysms recurred as often as the patient fell asleep, the disposition to which was so invincible, that this distressing scene was repeated every ten minutes, and had been so for several hours, in spite of every endeavour to prevent it.

Upon inquiry, I found that the patient had passed the 16th with a convivial party in camp, where he had drunk rather freely. He was called up in the night, to visit a general officer, and remained some time at a window conversing with the messenger, with a strong breeze blowing upon him, while undressed, and in a profuse perspiration. The ensuing day he felt a sense of fulness in his throat, with headache and other symptoms of fever. He took a purge, but had a restless night, and the following day kept his bed. The principal medical staff officers visited him in the afternoon, when the disease, as described above, had completely established itself. There was a suspicion of this being a gouty affection; but knowing the patient's mode of living and very full habit of body, and that he was not subject to atonic gout, but had regular fits of that disease in the extremities, I had no hesitation about his complaint being an inflammation of the larynx and superior part of the trachea.

Some difference of opinion regarding the nature and treatment of the disease here occurred, the

other physicians being averse to bleeding, considering the case more as spasmodic than inflammatory. Their objections were overruled, and it was immediately decided to take sixteen ounces of blood from his arm. By this he expressed himself to be considerably relieved. It was remarkable that while the blood was flowing from the vein, by a large orifice, the spasmodic affection of the throat did not recur: nevertheless, although the patient derived much benefit from the bleeding, this terrific symptom still continued to assail him upon his dozing; but with abated violence. Six ounces of infusion of senna, with some Glauber's salts, were ordered to be taken in the course of the morning. I left him at six o'clock, and at eleven A. M. met again the attending physicians. We found the advantage gained by the bleeding, according to appearances, only temporary: the pulse was full, hard and strong, and the sense of suffocation, if not quite so frequent, was as formidable as ever. A still larger quantity of blood than in the previous bleeding, was drawn from the arm with manifest advantage; for he could now sleep for a few minutes together without the dreadful sense of suffocation supervening, and the horrible appearance of strangulation. A very large blister was now applied to the breast.

When I called in the evening (the other physicians having taken their leave) I found a most pleasing change, the sense of suffocation was by no means so frequent in its occurrence, or so urgent as in the

forenoon; the frequency, fulness, and strength of the pulse were lessened; and the skin was much cooler. The cathartic had operated freely, and the blister had risen in every part. But the most flattering circumstance was, that the patient had enjoyed some refreshing and undisturbed sleep. Draughts with aq. ammon. acet. and tartarized antimony were ordered for the night. The next morning (the 20th) I found he had passed a very bad night, with frequent attacks of the sense of strangulation. He complained of headache, and was feverish, the pulse being fuller and more frequent than at the preceding visit. The blood taken the day before was covered with buff, and much cupped; and the urine was very high coloured. Under these circumstances, I did not hesitate again to have recourse to the use of the lancet, which now proved truly efficacious. From this period his safety seemed to be ensured, as he could shortly after lie upon either side, and sleep undisturbed for an hour together, without being seized with the spasmodic affection of the throat, where he merely felt a dull pain and uneasy turgescence, which gradually subsided under the use of purgatives and the antiphlogistic regimen. Previously to his obtaining manifest relief, he lay constantly upon his back, with his head a little elevated, in order to give as much capacity as possible to the thorax. For some time after his recovery, he continued to be hoarse, and to complain of a huskiness in the throat, which he endeavoured to remove by hawking and trying to expectorate.

Thus was this formidable disease extinguished at its commencement. Had it been treated in a less decided way, there is every reason to suppose from subsequent experience, that it would have proved irremediable.

To the above account I shall only add, that the patient who was the subject of the complaint was destroyed fourteen years afterwards, by another attack of this most painful and formidable disease, as is stated at large in the Third Vol. of "Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge" *. My inducement for entering into this detail, is to compare the two attacks of the same disease in the same person, after the lapse of many years; and to add somewhat to the information which has lately been obtained concerning the nature of a malady hitherto scarcely noticed, and known chiefly by its fatal termination.

* See 2d Case of 22d article.

REMARKS

ON THE PRECEDING

CASE

OF

CYNANCHE LARYNGEA,

BY THE

PRESIDENT OF THE SOCIETY.

Read February 28, 1815.

THIS case possesses much interest and conveys great instruction, as well from its successful treatment as from the subject of it having afterwards suffered a second attack of the same disorder, which proved fatal, as recorded in the Transactions* of another Society.

The diagnostics of this disease as exhibited in its characteristic symptoms during life, and by the appearances on dissection, distinguish it without the least ambiguity from every other species of sore throat.

Eight cases of it have been recorded within the last three years, of which three are to be found in

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. III. London, 1812. Art. 22.

the Transactions above quoted; and five, including the preceding case, in the Transactions of this Society.

Is it to be inferred from this, that no such disease existed in former times? I apprehend not*: nor is it new in the history of physic, that diseases should long exist without being duly noticed, described, and discriminated. The scarlet fever, for instance, was evidently mistaken by Morton for a variety of the measles, and was never stated as a distinct disease till towards the middle of last century, though it appears to have prevailed long before that time.

In consulting authors, I have met with a clear and unambiguous description of it only in two works, namely, in the Observations† of Lommius, an author who excels in accurate description, and

* The author remembers that in his attendance on the Lectures of Dr. Cullen, many years ago, that eminent professor, in the facetious and classical manner with which he occasionally illustrated the most profound subjects, and by which he commanded the attention and won the regard of his hearers in so remarkable a degree, used when treating of this subject, to quote the following lines from Horace.

Vixere fortes ante Agamemnona
Multi; sed omnes illacrymabiles
Urgentur, ignotique longâ
Nocte, carent quia vate sacro.

Lib. iv. Od. 9. L. 25.

† P. 99. Ed. Amstelodami, 1726.

in Morgagni *. There are cases nearly approaching to it in Hippocrates † and Tulpius ‡, but they belong more probably to the croup, no mention being made of difficult deglutition, for it is the combination of this with difficult respiration which constitutes the essence of the species under consideration.

As Nosology was not in use as one of the methods of cultivating physic till our times, as there is no where to be found before this invention any catalogue of all existing diseases, and as no author professes to treat of all known diseases, we have no means of ascertaining precisely what diseases existed and what did not, at any particular period. Works of Nosology, therefore, even though founded on a vicious system of arrangement, possess great value merely as comprehensive catalogues of diseases, and as affording scope for accurate description and discrimination.

The infrequency of this disorder seems to be a main reason for its having been so little noticed, and it seems to be a wise provision of nature that it should be so rare. If the glottis were by nature as liable to inflammation as the tonsils, the human species would have difficulty in maintaining its existence.

* De Sedibus et Causis Morborum, Epist. xliv. 3.

† Prænotiones Coacæ, p. 162. Ed. Francfort, 1595.

‡ Observationes Medicæ, Lib. 1. cap. 51.

We have in the present case an example of its real nature having been overlooked, for the first seizure passed at the time for a modification of a common sore throat. The casual coincidence of two eminent physicians in the metropolis having been affected with it about the same time, has led to an investigation which has established its specific nature. We seem now therefore to have a very complete nosology of the diseases of the throat, for the cynanche tonsillaris*, the most common species of sore throat, the C. Pharyngea or Quinsy, the C. Parotidea or Mumps, the C. Trachealis or Croup, and the C. Laryngea†, now under consideration, admit of descriptions as specifically defined as any objects of natural history.

The number of cases of this last species (the most rare of them all) which have already found a place in our Transactions, affords a striking proof of the

* The ancients do not include this under the appellation of *Cynancke*, or *Angina*. A difficulty of respiration, agreeably to the etymology of these words, was an essential character of them. The Greek and Latin authors call the C. Tonsillaris, merely an ulceration of the tonsils. They would for the same reason have excluded the C. Parotidea from this genus, but there is no allusion to this disease in any ancient author that I know of.

† There is a variety of the C. Laryngea, of which three cases have come under my observation. It consists in a state of chronic inflammation and suppuration of the larynx. They all proved fatal, and two of them being inspected after death, *pus* was found in all the interstices of the muscles, bones, and ligaments, and the organization of the whole considerably impaired. From the similarity of the symptoms I inferred the third to be of the same nature.

high value of such ample repositories of facts brought so closely and rapidly together, as to throw the most interesting and instructive light upon each other. When single cases of any disease, particularly a rare one, lie scattered in different works and at long intervals of time, the advantage of comparison and induction is in a great measure lost to the practitioner, who has to decide promptly on his measures; and it is to be hoped that the advantageous manner in which these cases have been brought forward, will lead to a more successful treatment in future, for it is a melancholy and mortifying truth that of these eight cases six have terminated fatally.

As the credit of medical practice is here deeply implicated, and as the world will be apt to say that they have a right to expect something more and better from a profession to which they lend so much of their confidence, and which they so liberally encourage and reward, it behoves us most seriously and anxiously to do our utmost to wipe off this *opprobrium*. In applying our minds to this, we are encouraged by reflecting that this is not one of those diseases which bear the ordinary characters of an incurable or intractable malady, such as those in which there is an irreparable lesion in the structure of vital organs, an exhausted constitution, or the overwhelming force of a morbid poison, the sole indication here being the subduing of a local inflammation.

The infrequency of the disease and the want of due attention to its peculiar symptoms in time past, may serve to excuse and account for the want of experience, and therefore of success in its treatment. And in this view it becomes a question whether the recovery of the two fortunate cases is fairly imputable to any peculiarity in the treatment.

In reviewing the history of all the eight cases it does not appear that there were any remedies or methods absolutely peculiar to the fortunate cases, except the use of oxygen gas in the present case, which seemed to afford temporary relief; but that there were some important points of practice in which these agree with each other, and which were either not employed at all in the fatal cases, or in a different degree and manner from what they were employed in the favourable cases.

1. The most remarkable of these was the employment of very large blisters. The expression *very large* is peculiar to the present case, and the relief is stated to have been immediate, substantial, and permanent. In the other successful case the term *large* blister is used. Of the unsuccessful cases there are two in which no mention is made of blisters, and one in which it was removed before producing its effect. In the other three a blister is mentioned as one of the remedies, with the epithet large to one of them. These facts therefore, in favour of large blisters, do not constitute an inductive evi-

dence amounting to certainty, but afford so great a probability as to create such a confidence in their efficacy, as to invite imitation.

From my own practice, and that of others of equal experience with myself, there is great room from analogy to place confidence in blisters of a large size in this disease; for in the inflammation of other vital parts, the bowels and lungs for instance, I can say from undoubted experience that I have seen the most striking success from blisters covering the whole thorax or abdomen, in cases similar to those in which small ones had failed. The effect of large blisters is indeed so different from that of small ones, that they may be considered as a distinct class of remedies.

In the present complaint it does not seem necessary that the blister should be directly over the part affected, which does not afford sufficient space; nay a better effect may rationally be expected by the application being made to the neighbouring parts, for the inflamed organs are so closely subjacent to the external surface, that the stimulus of the blister and the afflux of circulating fluids consequent upon it, might even prove hurtful. It is observed in inflammations of the eyes, that a blister at some distance is more beneficial than one very near, and in the present case the *very large* blister is stated to have been applied to the breast, and not to the neck. These, like many other powerful re-

medies, have been originally adopted on empirical grounds; but I would allege to those who wish to theorise on their operation, that whether they embrace the hypothesis of derivation and revulsion, or that of the determination of nervous energy or counter irritation, as it is sometimes called; the practice is equally consonant to all these views. Those numerous practitioners therefore under whose eyes these cases will fall, and in whose practice the like cases may occur, will probably be induced after the early and copious abstraction of blood and free purging, to cover the whole surface of the thorax with a blister, and to report the result to this Society.

2. The next point of practice least in common between the fortunate and fatal cases, is the early and copious bleeding above recommended. In the favourable case recorded in last year's volume, Mr. Wilson, the author, very judiciously observes, that in case the first bleeding should not be sufficiently copious, and when it becomes apparently necessary to repeat it in the advanced stage of the disorder, it becomes unsafe to carry it further, on account of the exhausted state of the patient. In the present case the patient is well described by Dr. Roberts, as having the face swollen and suffused, the eyes protruding, the carotid arteries pulsating, and as oppressed with somnolency, all which circumstances are expressive of strong arterial action and determination to the head. Free bleeding therefore,

local as well as general, seems here to be loudly called for as the first and most important step to be taken.

3. The only other practical point of great importance in the history of the two favorable cases, is the total abstinence from opiates. It appears to be clearly made out by dissection, that inflammatory determination to the membrane investing the larynx is the proximate cause of the disease, and that there is therefore every reason for avoiding opiates, till the complaint shall have been fully subdued by the antiphlogistic treatment.

It may be asked whether any remedies likely to prove serviceable have been left untried. From the apparent relief derived from external emollient applications in some of the more common species of sore throat, I should be inclined to propose the use of cataplasms and fomentations, either simple or medicated. It seems the more necessary to seek for external means of ease, as deglutition in some cases is extremely difficult and even impossible. It has been contended that the virtue of external applications does not extend beyond the part with which they come in contact; but there is a striking instance of the contrary in the power of Belladonna in dilating the pupil, where the effect is produced on an organ with which the medicine cannot come in contact.

It is to be hoped that the practitioners who peruse these Transactions, sensible of the great benefit derivable from the condensation and comparison of facts, will contribute their utmost endeavours to confirm or invalidate these remarks, and to communicate such further trials or suggestions as may serve to redeem the professional character, and to establish such improved modes of treatment as may more successfully combat this most dangerous and agonising disorder.

ACCOUNT

OF A

CASE

OF

CROUP,

IN WHICH THE

OPERATION OF BRONCHOTOMY

WAS SUCCESSFULLY PERFORMED.

By THOMAS CHEVALIER, Esq. F.L.S.

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AND SURGEON TO THE WESTMINSTER GENERAL DISPENSARY.

Read June 20, 1815.

MASTER B., aged seven years, had been much disordered in his stomach and bowels, and had a slight degree of fever. This, however, had so far subsided, that his parents intended to return to their home in the country. Mr. Lightfoot, who had attended him, called in the morning of April 25, 1814, and was told that the child had a little cold and cough; he recommended that if the complaint should increase, leeches should be applied to the chest, and then a blister. In the even-

ing his assistant informed him, that leeches and a blister had been sent for. Mr. L. was desired to call again on the following morning, when he found the breathing distinctly manifesting that croup had taken place. He instantly bled him largely from the jugular vein, and as soon as he recovered from the fainting which this produced, directed an emetic, which operated freely, and occasioned him to bring up a portion of a membranous substance, which appeared evidently to Mr. L. and Dr. Merriman, who was now called in, to resemble that found in the trachea of those who die of this disease. A purgative was given, and calomel was ordered to be taken every six hours.

On the afternoon of Wednesday the 27th, the difficulty of breathing greatly increased, the countenance grew livid, cold sweats came on, and he appeared sinking. He was, nevertheless, perfectly sensible. No chance of his recovery now seemed to remain, unless it were by opening the trachea, and I was applied to for this purpose. I exposed the trachea just below the cricoid cartilage, and divided two of the cartilaginous rings vertically, cutting afterwards transversely in the interstice between them. About an ounce or an ounce and a half of a reddish brown and frothy mucus gushed out through the opening, and by a tolerably full inspiration which presently followed, the child was enabled to cough up more of the same kind. The breathing became immediately relieved, the cold

sweat ceased, and the countenance in a short time resumed much of its natural appearance. The pulse was 160. On the morning of the 28th the breathing was much improved: pulse 144. He was directed to take half a drachm of Oxymel of Squill every hour in a little Camphor mixture; and four ounces of the Camphor mixture were to be employed as an enema, several times in the course of the day. In the evening his breathing had become quite easy, and the cough much less sonorous. On the 29th, he brought up with a slight cough about a dessert spoonful of tough mucus, but it did not appear that any had passed through the wound. He was better in all respects, and from this time his recovery was gradual and uniform, so that on the 13th of May he was sufficiently well to return to his home in the country.

Since this case occurred, I have had an opportunity of witnessing that of a child about five years old, in which the same operation was performed by my friend Mr. Blair. In this instance the first symptoms of disease were fever with an erysipelatous state of the tonsils, from whence inflammation extended into the trachea, producing impeded respiration. Suffocation was rapidly advancing, and the operation was deemed the only resource. The trachea was opened longitudinally, and more than an ounce of red and frothy mucus issued through the wound; this was followed by a pretty full inspiration, and a subsequent cough, in which

much more of the same sort of mucus was brought up. The bronchiæ then appeared to be entirely cleared: for the breathing became free and easy, and the child was for a short time greatly relieved; but the debility which had been previously induced by the disease was too great to be surmounted, and occasioned death the same afternoon.

In such cases of Croup as I have examined after death, I have found the trachea choked up with this mucus, and I am very much inclined to suspect that it is by it more than by the coagulable lymph, that suffocation is finally produced. When the quantity of mucus is such as to prevent the air from getting into the branches of the bronchiæ, and from thence to the air-cells, the patient becomes unable to clear the tube by coughing, the properties of the blood must rapidly degenerate, and death will speedily ensue. But I doubt whether this is so often to be ascribed to such an accumulation of the coagulable lymph itself, as absolutely precludes the transmission of air. If this suspicion be just, the use of bronchotomy must result chiefly from its emptying the trachea of mucus, and thus enabling the patient so to cough, as to clear the branches of the bronchiæ, without which the air, even if it pass through the obstructed larynx, cannot reach the lungs.

It would also follow, that the introduction of a canula, or tube, into the trachea after the opera-

tion, for the sake of securing the passage of air, is of less consequence than has been usually supposed, and might even be better omitted, as the presence of an extraneous body must irritate the internal membrane, and would thus be likely to increase that secretion of mucus, from an accumulation of which the principal danger is to be apprehended. See Mr. Andree's case in the 3rd Vol. of this Society's Transactions, pages 336 and 337. In the instance which I have related, I found no necessity for a tube, though I am sure little or no air entered through the wound.

A NEW METHOD

OF

TYING THE ARTERIES

IN

ANEURISM, AMPUTATION,

AND OTHER

SURGICAL OPERATIONS;

WITH

INCIDENTAL REMARKS ON SOME COLLATERAL POINTS.

BY WILLIAM LAWRENCE, Esq. F.R.S.

PROFESSOR OF ANATOMY AND SURGERY TO THE ROYAL COLLEGE OF SURGEONS; ASSISTANT SURGEON TO ST. BARTHOLOMEW'S HOSPITAL; SURGEON TO BRIDEWELL AND BETHLEM HOSPITALS; AND TO THE LONDON INFIRMARY, FOR DISEASES OF THE EYE.

Read July, 1814.

HÆMORRHAGE was for a long time the principal source of danger and dread in surgical operations; and its frequent occurrence and fatal consequences, not less than the ordinary mode of arresting it by the hot iron, too amply justified the alarms and anxiety both of the patient and surgeon. The application of the ligature to the arteries divided in amputation was, on this ac-

count, so important a discovery, that Ambrose Parè, to whom we owe it, conceived that he was indebted for it to a kind of inspiration*: the subsequent invention of the tourniquet served to complete our means of stopping the flow of blood from large arteries. It was long however before the full benefit was derived from the use of the ligature. Large portions of surrounding substance were included with the arteries †; the wounds were filled and covered with extraneous matters: the secondary hæmorrhage, which naturally followed these practices, set the surgeon to devise fresh precautions against the supposed insufficiency and insecurity of the ligature. Hence the use of astringents, of styptics, of compression, and of other auxiliary means, which could only aggravate the evils they were designed to prevent.

While these practices continued, and the processes of nature in the healing of wounds, and the suppression of bleeding, were so little under-

* "Joint que comme l'on vient a brusler la partie amputé, le plus souvent quand l'escarre vient a cheoir, il vient un nouveau flux du sang; comme j'ay apperceu plusieurs fois n'ayant encore esté inspiré de Dieu d'un si seur moyen lorsque j'usois du feu." Apologie; Œuvres, 1641, p. 778.

† Pouteau ascribed the suppression of hæmorrhage and the obliteration of the artery, to the tumefaction of the substance included with the vessel in the noose; and hence was led to employ and recommend what he calls *ample* ligatures, by which much of the surrounding parts is included. Œuvres posthumes, v. II. pp. 321, 327, 342 et seq.

stood, we can hardly be surprised that it still remained a question, whether the ligature, styptics, or compression were the best method of arresting hæmorrhage; and that the latter was even preferred by some excellent surgeons in the middle of the last century. Jean Louis Petit, one of the ablest practitioners whom France has produced, adopts the latter decision in the most unequivocal terms. "No difficulty can be felt in coming to a determination, after the comparison, which I have instituted, between the different methods of stopping hæmorrhage. Compression is undoubtedly the best. Absorbents are insufficient in great bleedings. Styptics and Escharotics cause great pain, destroy the parts extensively, and often expose the bones; the bleeding, too, often recurs on the separation of the sloughs. The ligature in truth commands the bleeding more completely; but it causes great pain, spasm, and sometimes convulsions of the stump, which are often mortal, either of themselves, or by the bleeding they occasion*." He says further, in speaking of an operation performed in 1730, in which he employed, on account of secondary hæmorrhage, an apparatus for compression, represented in the 76th plate of his treatise, fig. 4: "The instance I have related proves that bleeding may be stopped after amputations without styptics, caustics, or ligatures;

* Traité des maladies chirurgicales, et des operations qui leur conviennent: v. III. p. 150.

and my observations and reflections on these means shew that they are less advantageous than compression. We shall be the more inclined to employ the latter, when we find that it can be executed by means of a safe and simple machine of easy construction. But its use will not be confined to the thigh; I cannot doubt that it may be employed with still greater success in the arm and leg, since it will be more easily adjusted to those parts, and the vessels are less considerable *." Morand, a distinguished member of the justly celebrated French Academy of Surgery, communicated to that body in 1750, "a new method of stopping hæmorrhage from arteries without the assistance of the ligature." The use of agaric, which it was the object of this memoir † to recommend, was hailed by the Academy as an important addition to the resources of surgery; and the result of its employment in aneurism and amputation, at the hospitals of the Invalids and La Charité, was deemed so satisfactory, that the discoverer received a reward from the king.

The inflammation, the spasms, the dreadful pain and the secondary bleeding, with all their attendant train of dangerous consequences, falsely attributed to the ligature, but really produced by the mode of dressing, and aggravated tenfold by the

* Lib. cit. p. 164.

† Mem. de l'Acad. de Chirurgie, tom. II. art. 16, p. 220.

various precautions designed to prevent or remove them, were completely obviated by the practice of closing the wound immediately, and promoting its union by adhesion. This process, although familiarly resorted to in slight cases, and described by the older writers under the name of *union by the first intention*, was not employed in the great surgical operations, until a recent period. Our countryman Mr. Alanson* has the honour of first practising it in amputation: the principle has since been extended to all surgical operations, while the nature of the process has been investigated, and its laws fully ascertained, by Mr. Hunter. This great improvement, which is entirely due to the genius and labours of Englishmen, has been for many years completely established in this country, and employed in every case of wounds, whether surgical or of any other kind, to which it is applicable. No where else, however, have its merits been so justly appreciated, or its practical benefits so abundantly felt. In the metropolis of a neighbouring nation, disposed to contest with us the palm of surgical superiority, a young surgeon of distinguished zeal and industry †, has found it necessary to explain and recommend to his professional brethren, in the last year, the practice of

* Practical Observations on amputation and the after treatment; 1779.

† M. Roux, surgeon of La Charité, in his "Mémoire et observations sur la réunion immédiate apres l'amputation circulaire des Membres dans leur continuité, et specialement après l'amputation de la cuisse;" 8vo, Paris, 1814.

immediate union after amputation; but he has not yet convinced them of its utility.

Surgeons are yet living, who remember the time when aneurisms were thought a sufficient ground of amputation *; and who saw, nay perhaps even themselves practised, the dressing of the wound made by removing a limb, as an open sore. Yet aneurisms are now cured by an operation extremely simple, of little pain, and less danger; of which the revival, and scientific explanation, drawn from a knowledge of the processes and powers of the animal œconomy, if not the first proposal, came from the active and comprehensive mind of Hunter; and amputation even of the thigh, is not regarded, under ordinary circumstances, as an operation of danger, or of considerable suffering. Such improvements, while they are gratifying to every friend of humanity, as the means of preventing distressing apprehension, acute suffering, and painful mutilation, afford a just and honourable ground of exultation to the surgeons of that country, in which they have been proposed, investigated, and brought to perfection.

The effects of the ligature on a living artery, and the consequences of its application, were not

* Mr. Pott on Palsy of the lower limbs, and on amputation, 1779; pp. 72 and 73.

known until very recently; the principle that should govern its employment, would not therefore be understood. Dr. Jones* undertook an experimental investigation of this subject, and has explained it in a clear and satisfactory manner, which makes us deplore his premature death as a loss to science. He has banished the use of thick and broad threads, of tapes, of reserve ligatures, of cylinders of cork and wood, linen compresses, and all the contrivances, which, employed as securities against bleeding, only served to multiply the chances of its occurrence. The use of the ligature therefore, under the modifications suggested by our present knowledge of the processes of nature, may be considered to have arrived at perfection.

Ligatures, however, being foreign bodies in contact with the surface of the wound, must irritate, must cause inflammation and suppuration. In amputations, where it is necessary to secure many vessels, a large portion of the wound is exposed to this irritation; its union is retarded, and considerable pain and spasm are sometimes produced. Are these evils inseparable from the use of ligatures? or is there any plan by which we can avoid them? I think that there is; and I shall proceed to state to the Society the trials I have made, and

*A Treatise on the process employed by nature in suppressing the hæmorrhage from divided and punctured arteries, and on the use of the ligature; Lond. 1810.

the experience which my practice has furnished on this subject. A longer delay would have enabled me to ascertain some points more satisfactorily, and to procure opportunities of trying the method in cases, to which I have not yet applied it. But several friends have urged me to make the proposal known; and I accede to their suggestion the more readily, as it may lead others to make trials, and thus enable us sooner to appreciate the value of the proposal.

The method I have adopted consists in tying the vessels with fine silk ligatures, and cutting off the ends as close to the knot as is consistent with its security. Thus the foreign matter is reduced to the insignificant quantity which forms the noose actually surrounding the vessel, and the knot by which that noose is fastened. Of the silk which I commonly employ, a portion sufficient to tie a large artery, when the ends are thus cut off, weighs between $\frac{1}{50}$ and $\frac{1}{60}$ of a grain: a similar portion of the thickest kind I have tried weighs $\frac{1}{30}$ of a grain, and of the slenderest $\frac{1}{100}$. These ligatures do not interfere with the process of adhesion, and we shall hardly entertain any serious apprehension that substances so minute will excite subsequent irritation and disturbance.

That kind of silk twist, which is commonly known in the shops by the name of dentists' silk, and which is used in making fishing-lines, is the

strongest material I know of, in proportion to its size, and therefore the best calculated for our purpose, which requires considerable force, in drawing the thread tight enough to divide the fibrous and internal coats of the arteries. This twist is rendered very hard and stiff by means of gum, which is applied to it in the process of its manufacture, and may be removed by boiling it in soap and water. The latter process loosens its texture, elongates it, and makes it weaker, so that, after boiling, we can break with the fingers a thread, which could not have been so broken before.

The stoutest twist, which I have used, is a very small thread compared to the ligatures made of inkle, which are commonly employed at St. Bartholomew's Hospital: I cannot however break it with my fingers and thumbs, although a great force may be applied in this way, by winding the thread round the ends of the forefingers, and drawing it over the ends of the thumbs, as in the ordinary method of tying the arteries. The quantity of such a thread, necessary for the noose and knot on the iliac artery, weighs $\frac{1}{20}$ of a grain; or if the gum has been removed, about $\frac{1}{28}$. But the finest twist kept in the silk shops is strong enough, in its hard state, for any surgical purpose; and the noose and knot would not weigh $\frac{1}{40}$ of a grain. The finer kinds of silk, if used very cautiously, will answer the end extremely well; but their breaking so easily is an objection to their common

employment. When the muscles or other soft parts in an amputation, are diseased and thickened, or when it is necessary to include some of the surrounding substance with the bleeding vessel, a stronger ligature is necessary, than for tying an artery fairly drawn out from the surface.

A question, no doubt, will be made here, whether it is safe to use these small ligatures on the large arteries; whether there may not be a risk of cutting the coats completely through? For we have been instructed to adapt the size of the thread to that of the vessel, and to tie a great trunk with a thick ligature. There is no reason for this rule *prima facie;* we can only determine its justice by examining into the effects of different ligatures on the arterial coats.

In the first place, the aorta was not cut through at any point by any ligature, whether large or small; I tried various threads on the aorta of a woman 35 years old, and of a man of 40, in both which vessels there were some opaque spots in the internal coat. Still less was any effect of this kind produced in the primary, the external or internal iliacs. A thick ligature completely divided the internal and the fibrous tunics, detached them extensively from the external, and left a very thin stratum of the cellular coat uncut. The strongest twist had a similar effect; but the remaining stra-

tum was not so thin, nor were the divided tunics so much detached. The weaker silk ligatures did not in general completely cut through the two internal coats; sometimes the fibrous tunic was divided, the internal remaining nearly entire; or some fibres of the middle coat were uncut; or shreds of the fibrous and internal were left: sometimes there was a simple clean cut of these tunics, not going completely through: there was no detachment of the coats, and a considerably thicker external portion remained undivided. This difference in the appearances did not arise from the thinner ligatures being more loosely applied: for they were drawn as tightly as was consistent with their strength. If great pains are taken to draw them more closely, the inner tunic may be more perfectly cut through: but this degree of force cannot be conveniently applied to an artery at the bottom of a wound in the living subject.

Similar results were obtained from trials on the aorta and iliac arteries of a man 70 years old. The detachment of the internal and middle coats by the large ligatures was more extensive, and the undivided external cellular stratum very thin, particularly in the aorta. The smallest twist, when tightly drawn, divided the middle, but not the internal coat. Middle-sized washed twist was not strong enough to cut the coats; but when doubled, it divided them cleanly.

There is, I believe, little, if any, difference in the power of resistance, between a living and a recently dead artery; the fibrous coat is equally brittle in both, and we feel it give way when the ligature is drawn tight on a living artery. The external cellular covering, like other parts composed of the same texture, preserves its strength after death, and does not withstand the ligature more effectually in the living state. Hence the above description may be trusted as a representation of what occurs where ligatures are applied to the arteries of living bodies. It corresponds at least with what we see when we have opportunities of inspecting tied arteries after death. I found an effect corresponding exactly to that above described, produced by a thick ligature on the external iliac artery of an old man, who died three days after the operation in St. Bartholomew's Hospital. In the aorta of a dog, which I had tied with middle-sized washed twist, thirty-six hours before the animal's death, the fibrous coat was cut through, while the internal was very partially divided*.

* The animal's hind limbs were completely paralysed in three minutes after the application of the ligature, and continued so. In twenty hours after the operation the temperature of the axilla was 6 or 8 degrees higher than that of the groin; the animal supported himself on his fore-limbs, and lapped some milk. No other cause of death could be found than the tying of the artery; the abdomen being unaffected, and the surrounding parts no further disturbed than was necessary for securing the vessel.

The appearances of the tube, whether in man or animals, examined soon enough after it has been tied during life, to allow the original effect of the ligature to be seen, are just the same as those of an artery tied in the dead subject.

That the effects of the small ligature as detailed in the foregoing trials, are much the best calculated to promote healthy adhesion of the arterial coats, and to maintain them in contact, until this union has become firm enough to resist the impetus of the blood; while the thick cord is most likely to produce sloughing of the detached external stratum, to be discharged before the end of the vessel has been united firmly enough to withstand the force of the blood, and thus to expose the patient to the risk of secondary hæmorrhage, are points too obvious to require further illustration. Hence, if any proportion is to be observed between the size of the artery, and of the ligature, it should be an inverse one: the large vessel requiring a small ligature, while a small artery may be tied without danger with a large one.

The periods, at which the ligatures come away after the operation, corroborate the conclusions which have been just drawn. They were detached very early after the operations upon the external iliac artery, recorded by Mr. Abernethy, who mentions that he used thick ligatures. Thus, in one

case we find that the upper ligature separated on the 10th, the lower on the 15th day*; in another, the upper on the 15th day†; in a third, both about the 16th or 17th‡; in a fourth, the lower on the 4th, the upper on the 18th day§; and again, both on the 10th day‖. The axillary artery having been tied by Mr. Ramsden, with two thick ligatures, close to each other, had its two extremities very nearly separated on the 5th day¶. I tied the femoral artery in a case of aneurism with a very small thread ligature, which was not detached till the 18th day; and a similar ligature which I placed on the external iliac artery, in operating for inguinal aneurism, remained on the vessel till the 27th day, although in both these cases I frequently drew the threads, expecting they would come off. Fine silk threads remained firm on the carotid of a dog, at the end of a month.

This comparative view will, I hope, set at rest all apprehensions of danger to the arterial coats from small ligatures; while it proves that the use of large ones is not altogether so safe a practice, as the advocates for their employment have hitherto fancied.

My readers will here certainly put a question which I must notice, although I am not in posses-

* Surgical Works, 1811, Vol. I. p. 236. † Ibid. p. 241.
‡ Ibid. p. 264. § Ibid. p. 269. ‖ Ibid. p. 285.
¶ On the Sclerocele, &c. &c. p. 276.

sion of the facts which are necessary to answer it satisfactorily. What becomes of these ligatures? Do they come away with the discharge, or remain where they are placed? in the latter case do they lie quietly in the parts? are they surrounded by a cyst containing matter? or may they be absorbed? The results of some experiments on dogs, which I shall relate in speaking of the operation of aneurism, shew that these ligatures do not separate very quickly. If they remain where they are placed in the human subject, as long as in these brutes, they must undoubtedly be inclosed by the union of the sides of the wound, and they could be discharged afterwards only by exciting irritation and suppuration. I apprehend that the layer of lymph, which is so quickly effused on cut surfaces, covers and incloses these small threads which must therefore be retained in the wound. At all events, I have not seen them come away; but hitherto no opportunity has occurred to me, of examining parts at a sufficient distance of time from their application, to throw any light on their ultimate fate. In no case has there been any abscess after the healing of the wound; nor any other symptom that could be ascribed to these ligatures.

In a work on gunshot wounds and amputation, published sometime after I had begun to use the silk ligatures at St. Bartholomew's Hospital, Mr. Guthrie, an army surgeon, mentions that the practice of cutting off the ends of the ligatures close to

the knot, has been lately adopted by some military surgeons, both French and British. When the wound has healed quickly, the knots have been subsequently discharged at small abscesses. Several cases treated in this way have ended successfully; and in particular, many under the care of Professor Delpech, of Montpellier. In two or three instances Mr. Guthrie saw ill-looking abscesses formed by them. As this statement is not accompanied by any description of the materials or size of the ligatures, nor by any details of the unfavourable cases, we cannot judge whether the events alluded to are to be attributed to the method itself, or to the way in which it was executed.

During the last ten months I have employed this method of securing the arteries in ten or eleven cases of amputation, in six operations on the breast, and in the removal of two testicles. The cases all did well, excepting a man who lost his thigh and who died of an affection of the lungs: the wounds healed readily, and nothing was seen of the ligatures.

If this plan should not be found entitled to the important praise of promoting adhesion, and of securing the arteries in a safe and effectual manner, which however my present experience convinces me that it deserves, still, as it supersedes the necessity of threads hanging out of the wound, the

management of which is so often troublesome and painful, it may be recommended, on the grounds of superior convenience to the surgeon, and comfort to the patient.

After these general observations, I proceed to offer a few remarks on amputation, and the operation for aneurism; and to mention the particulars of such cases, in which this new method has been employed, as may be deemed worthy of attention on other accounts.

On Amputation.

Cutting the ligatures short removes from the wound the principal obstacle to its speedy union: the same object must be kept in view in other parts of our treatment. When the process of adhesion fails, it is from the inflammatory process running too high, and passing into the suppurative stage. We should therefore attempt to diminish the action of the vessels, which is most effectually accomplished by reducing the temperature of the part. Is this object likely to be gained by covering the whole surface with adhesive straps, by tight bandaging, by flannel rollers, tow pledgets and worsted caps? When the vital powers of a limb are impaired by the interruption of its arterial trunk, in the operation of aneurism, we envelop the part in flannel, and use other means to prevent the dis-

sipation of its heat. The opposite treatment is required after amputation. The parts are to be gently brought in contact by strips of adhesive plaster, avoiding all force and strain, which are very painful and injurious, when the subsequent tumefaction comes on. Instead of carefully covering every part of the edges, I rather leave intervals between the straps, at which the blood may escape, if there should be slight oozing; with this view it is well to leave the inferior angle of the wound open. A small bit of lint spread with white cerate should be applied on the parts which are not covered by the adhesive plaster. A soft folded rag dipped in cold water, or in a saturnine lotion, and squeezed out, should then be laid over the stump, and be kept constantly damp; the limb itself being covered by a sheet only. It is hardly necessary to mention, that under some circumstances these precautions against too great action are not required; that the rags are to be used damp, but not dripping wet, so as to inundate the bed, and give the patient cold; and that it would be contrary to principle to chill the parts. Such appears to me the surest method of promoting adhesion, of keeping down inflammatory action, and thereby preventing spasms, secondary hæmorrhage, and protrusion of the bone.

CASE I.

I amputated the leg of Louisa Webster, 20 years of age, in St. Bartholomew's Hospital, in October, 1814. Four arteries were tied with the finest silk ligatures, and the stump was treated in the manner just described. When it was opened on the fourth day, the integuments were not in contact, but the rest of the wound had united; except in a small spot opposite to the sawn end of the tibia, and another about half an inch in depth, a little behind this. These openings were however filled up in a few days, so that the wound was then superficial, and healed quickly. Her medical attendant informs me by a letter of this day, July the 8th, 1815, that she has had once or twice slight superficial ulceration of the cicatrix, opposite to the end of the bone, and that the stump is at present perfectly sound. I have since seen her myself, and can corroborate this account by my own examination of the limb, and inquiries concerning its state since she left the hospital.

CASE II.

Amputation at the Trochanter Major.

James Macdonnel, of Kirby Street, Hatton Garden, 16 years old, was admitted into St. Bartholomew's Hospital, in the winter of 1814-15, with

a considerable general swelling of the thigh, which had begun a year and a half before, and had been attended with severe pain. The bone was manifestly enlarged, and the whole tumour firm.

Judging it to be a case of necrosis, I directed that two caustic issues should be made and kept open. In a few days a most violent attack of erysipelas seized the whole limb, and a large collection of matter was discharged at the upper and anterior part of the thigh, which at the same time became shortened by about one-third; while a sharp edge of bone projected against the skin a little above the knee, and soon actually penetrated the integuments. The poor boy was now in the last stage of suffering and hectic. The discharge from the abscess was most copious, and increased greatly on pressure in the groin; the pain was constant and acute, and aggravated to agony on any attempt at motion. He was reduced to a mere skeleton. In this deplorable state, the nature and extent of the disease being quite uncertain, while it obviously reached so high that the removal of the thigh-bone from its socket seemed necessary, if any thing were attempted, I thought an operation would be deemed mere wanton cruelty; that the patient would probably die on the table, and therefore I determined to leave him to his fate. Although the local complaint continued the same, and the discharge, irritation, and pain were unabated, he appeared in a few days to have increased rather than declined in strength, and he had a better pulse. Judging that

the limb might be taken off close to the pelvis, and that the head of the bone might be removed from its socket, on the face of the stump, if the condition of the parts, as discovered in the operation, should render that measure advisable; and deeming it not impossible that the lad might survive the operation and recover, I represented the state of the case to the mother, who, as well as the patient, was willing, on this faint ray of hope, to submit to the slender chance of preserving life, which my proposal held out. I never saw a more unpromising subject placed on the operating table, nor undertook an operation under more unfavourable and discouraging circumstances. Besides the poor lad's scarecrow figure, which consisted of very little more than bones; the contracted, swollen, and misshapen thigh, had been for so many weeks bent close to the body; and the slightest change of position, from the excruciating pain it caused, was so entirely impracticable, that it seemed almost impossible, both to compress the artery at the crural arch, and to carry the knife through the front of the limb. On cutting the soft parts in front, about an inch and a half below the crural arch, a large abscess was opened, which reached quite to the groin; the femoral artery was now secured, the compression performed by my friend, Mr. Henry Earle, having effectually prevented the flow of blood through it. The incision was carried along the back of the limb, so as to complete the circle; the soft parts were detached from the bone, and the latter was sawn through obliquely in the trochanter major, so as to remove

the exterior and lower half, or two thirds of that process. There was very little bleeding from the posterior part of the limb. About five arteries were tied with common thread ligatures, of which the ends were cut off; and the sides of the wound were gently approximated by means of broad adhesive straps. The reduced state of the patient required every support that wine and nutritious diet could afford; the removal of the irritating cause was the most effectual narcotic. He rested well after the operation, and recovered rapidly. The limb was removed on the 10th of March, 1815, and the parts have continued perfectly sound to the present time, July 10th.

The head of the bone might have been very easily removed from the socket in this case: perhaps the proceeding I have described would be found an eligible mode of amputating at the hip joint; the bone being first sawn through at the trochanter major, after a circular incision of the soft parts, and the remainder subsequently removed from the face of the stump.

The affection was found, on examination of the limb, to have been necrosis: the dead part was a portion of the whole shaft of the femur, about four or five inches long, lying loose in a large cavity filled with pus, and projecting by its lower end through the skin. The new bony case was imperfect, forming about a half cylinder, corresponding

to the outer and back part of the limb, so that on the anterior and inner aspect the sequestra was only covered by the soft parts. The new bony case was continued from the upper and lower ends of the old bone, which were sound; but these upper and lower portions were joined only by soft parts, the deposition of new bone not being complete in the middle of the limb. Hence the limb, which had retained its natural length so long as the sequestra remained connected to the sound ends of the old bone, became so remarkably shortened as soon as the absorbents had detached this dead piece, in consequence of the retraction of the inferior portion, now unconnected with the superior, except by soft parts.

Cases of immediate amputation after severe injuries.

In injuries of the limbs which render the attempt to save them hopeless, and therefore confessedly require amputation, should the operation be performed immediately, or be delayed until the decline of the local inflammation, and of the sympathetic constitutional disturbance, which follow the injury? Reasoning *a priori* would quickly bring us to decide in favour of the former; that is, of amputation performed, not at the very instant of the accident, but at any time before the accession of the local and general inflammatory symptoms: when these have come on, the operation, although comparatively early, is allowed on all sides to be improper.

The accidents which demand the removal of limbs, are of the gravest kind; extensive wounds or bruises, with laceration, shattered bones, exposed joints, &c. Which is most dangerous; the clean cut of an amputation, or one of these wounds? The question is not, as it has often been stated on the other side, whether robust health is more favourable for a great operation, than the weakness produced by long disease and confinement, (although a reference to experience may determine this point rather differently from what the proposers of the inquiry anticipate); but whether a man in robust health will bear the severest injury better than the incision made in removing a limb; or, more accurately, whether he will bear both these in succession, better than the latter alone.

If we delay operating until the constitution is reduced to the standard which we have determined on as the safest, besides the pain and danger of the amputation, which we will suppose to be the same in both cases, the patient has the additional suffering of a more severe injury, and the additional risk of a more dangerous local disorder, all for no purpose. In other words, the surgeon who defends delay must be prepared to prove, that a man with a dreadful injury has a better prospect of doing well, if he first goes through all the local and general suffering, and the risk of life inseparable from the nature of the accident, and then submits to amputation, than if he loses his limb at first. These, and other

points, are ably stated by Boucher, in whose memoir, so far as argument goes, the reasonings of the advocates for delay are satisfactorily refuted, and the propriety of early amputation unanswerably established*.

Of late years, military and naval surgeons have had ample opportunities of settling this question in the most decisive manner; that is, by the test of experience, which has fully confirmed the preceding reasoning. The practice both of British and French surgeons has abundantly demonstrated, not only that many lives are saved by early amputation, which would be lost before they could reach the period for secondary operation; but that, out of equal given numbers of the two kinds, a greater proportion is saved after immediate, than after delayed amputation. For the proofs I refer to the works of Larrey † and Guthrie ‡.

The result of naval practice corroborates the preceding views, and confirms not only the safety,

* Observations sur des plaies d'armes à feu compliquées surtout de fracas des os: seconde partie, où l'on examine en général, si dans le cas de la necessité absolue de recourir à l'amputation, il est plus avantageux de la faire d'abord, que de la retarder.

Mem. de l'acad. de chirurgie, Vol. ii. 4to Edit.

† Memoires de chirurgie militaire. See particularly the mem. sur les amputations, V. ii. also V. iii. p. 38, & seq. p. 349, & seq. 361, 378.

‡ On Gunshot Wounds of the extremities, requiring the different operations of amputation, p. 1—81.

but the greater advantages of early amputation. I was informed by Dr. James, that when he was surgeon to His Majesty's Ship Cerberus, he performed, in the year 1812, twenty-two immediate amputations within three weeks; the greater part of them after an engagement with a French squadron off the island of Lissa in the Adriatic. Two of the men who had lost very large quantities of blood, and could not therefore be deemed fair cases, died: in one of them the lower extremity had been carried away above the knee, by a cannon ball; but all the rest recovered.

The inferences from these facts, and the practical rules to be drawn from them, are too obvious to be disputed; but in reply to them, it has been attempted to establish a distinction between military and naval practice, and that in civil life; and the propriety of early amputation, admitted in the former, has been denied in the latter.

This is truly a distinction without a difference. Is not a severe wound accompanied with inflammation, suppuration, gangrene, symptomatic fever, &c. in common life? and are not these as dangerous to the citizen as to the soldier? If the former enjoys any prerogative in this respect, will not the causes of such a privilege equally protect him from the dangers of immediate amputation? that is, if a grave injury be attended with less risk in civil than in military life, amputation must be also less

hazardous. I speak of cases confessedly requiring amputation, and am not considering whether it may not be justifiable to amputate under particular circumstances, in military and naval practice, for injuries which may be expected to recover in common life. I assert that all the arguments and principles which are applicable to the question of early amputation in the one case, hold equally good in the other. In support of these views I shall relate three cases, which are not selected to answer the particular end, as I have no contrary evidence.

CASE III.

——— Roberts, 38 years of age, a man addicted to liquor, with a sallow unhealthy countenance, was brought into St. Bartholomew's Hospital, in the month of November, 1814, in consequence of having been thrown down by a carriage, of which the wheel passed obliquely over the leg, from the front of the limb, just below the knee, to the ankle. A cut was found in the skin, of the extent just mentioned; the integuments were separated from the muscles all round the leg, in its lower three-fourths, so that the hand could be passed between the skin and subjacent parts. The muscles themselves were exposed and injured in some points, and the lower end of the tibia was broken. His sufferings from the wound were considerable and

increasing; and the nature and extent of the injury determined me to amputate, which I did about four hours after the occurrence of the accident; using ligatures of fine silk, the application of which, as the arteries could be easily drawn out from the surrounding parts, gave not the slightest pain. As the incision (in order to remove the limb below the knee) was made where the integuments had been detached, and the muscles considerably contused, none of the wound united by adhesion, and its cicatrization was consequently slow; but the constitutional disturbance was at no time greater than what occurs in common operations, and considerably less than we frequently meet with in subjects who undergo the operation after debilitating disease.

In confirmation of the propriety of amputating in such a case, I may mention a fact communicated to me by Mr. H. Cline. A man in whom the integuments of the thigh had been extensively detached from the subjacent parts, in an analogous manner to that of Roberts, but without fracture or great contusion, and without bleeding, died within twenty-four hours.

CASE IV.

——— Hall, a young man about twenty, had his wrist and hand terribly shattered by the burst-

ing of a pistol, with which he was amusing himself in the evening, at the rejoicings in celebration of the battle of Vittoria. The pain was acute, and agitated him exceedingly: it extended from the laceration to the contiguous parts, shooting up the fore-arm, the arm, and even to the shoulder, and increasing in intensity. Amputation performed in the fore-arm a few hours after the accident relieved him considerably: he passed a comfortable night, and recovered without an unpleasant symptom.

Although the following be not strictly a case of immediate amputation, it may be considered such to all intents and purposes; it is still more important on account of the affection for which it was performed, and the particular state of that affection.

CASE V.

Amputation at the shoulder-joint, in a spreading mortification of the arm.

John Larkins, a stout Irish labourer, 23 years old, fell from the third story of a scaffold on Saturday the 18th of May, 1815, and was brought into St. Bartholomew's Hospital. He fell from the third story to the second, from that to the first, and thence to the ground. There was a bad compound dislocation of the left wrist, and a severe hurt of

the back, towards its lower part. He received the necessary attentions from the dresser of the day, who saw his arm and hand swoln and painful, but without any indication of danger, late in the evening of the 19th, when he left him without any complaint as to his general health; he, however, passed a dreadful night, never closing his eyes; with the limb most acutely painful, and a corresponding disturbance of the whole system.

The dresser discovered, on the morning of the 20th, that mortification had taken place, and sent for me. I found the hand and whole fore-arm livid and perfectly cold; the lower part of the arm discoloured and losing its temperature, and emphysema of the cellular substance reaching nearly to the shoulder. The pulse was hurried, and the countenance expressive of great anxiety. The patient was immediately informed that amputation at the joint was the only means of saving his life: he allowed about an hour to elapse, before he made up his mind on the subject, and the mortification in this interval had manifestly advanced; the discolouration and tumefaction having approached nearer to the shoulder, and the cellular substance in the axilla, where the incision was made, being decidedly emphysematous. I removed the limb at the shoulder-joint, tying one artery besides the main trunk, and leaving the cartilage of the glenoid cavity untouched. The constitutional disturbance was inconsiderable: his principal complaint was of

pain in the back, which interrupted his rest, and made all motion extremely painful and nearly impracticable. For a short time when the healing had considerably advanced, a small quantity of pus came out on pressure from the middle of the sore, as if from the glenoid cavity. Nothing could proceed more favourably than this case, in which the only troublesome circumstance was the pain of the back: this indeed was for a long time constant and considerable; being also deep-seated, quite out of proportion to any visible contusion, and not aggravated by any external pressure, it made me apprehensive of serious injury to the spinal column. It declined, however, after some weeks.

The skin of the amputated limb was greenish and livid; but the cuticle not yet detached. The cellular substance distended with air, and with a discoloured offensive sanies; its appearance was not quite natural, where the incision took place; it was yellowish and anasarcous. Small effusions of blood were observed here and there in the course of the nerves; even as high as the amputated part. No coagulation of the blood in any of the arteries, even down to the ulnar and its digital branches. All the soft parts were discoloured, dark red and livid, and a frothy reddish fluid issued on incision. The joint of the wrist had been so severely injured, that the hand could be turned almost completely round on the fore-arm.

Considering how various the nature and causes of those changes are, which we include under the general term mortification, it has always struck me that the surgical rule of waiting for amputation until the gangrene has stopped and the line of separation is established, has been laid down too absolutely*, and can only be retained with exceptions

* To shew that the rule of waiting till the mortification has stopped, has been expressed in an unqualified manner, I shall quote passages from two modern authors, whose judgment, learning, and reputation will satisfy us, that they express the general sentiments of surgeons on this important practical point.

"It has been generally found, *wherever it* (amputation) *has been practised, in either acute or chronic gangrene,* to accelerate much the progress of the disease, and in this way to hasten the death of the patient. The parts which were divided in amputation, though at a distance from a spreading gangrene and from sphacelus, were found speedily to assume the appearance of the affection, for which the operation had been performed. Till, therefore, the adhesive inflammation comes on, and a distinctly marked separation of the dead from the sound takes place, amputation is *in few, if in any* cases of mortification admissible. We never know, previously to this, where a gangrene or sphacelus are to stop, nor whether the powers of the constitution be sufficient to sustain the injury that the mortification has inflicted. Even when the adhesive inflammation comes on, it is, in most cases, best to allow some time to elapse before we operate, partly with a view to give time for the constitutional symptoms to abate, in other instances, to allow the patient's strength to be recruited by nourishment and cordials, and partly also, with a view to learn, whether the constitution of the patient be indeed capable of so great a fresh shock, as that which amputation must necessarily occasion."

Thompson's Lectures on Inflammation, &c. p. 582.

"Mais

and limitations. The issue of the preceding case clearly proves that that *humid* kind of gangrene, which occurs in a healthy subject from severe local injury, which so rapidly affects, or rather *infects* a whole limb, and reaches the trunk in a few hours, must constitute one of these exceptions. A delay of two hours would have rendered it impossible to save this patient. It may indeed be stated generally, that the operation, even if its result should be deemed hazardous, offers the only chance of life; and that without it, the patient's fate is certain.

I would not be understood as meaning to recommend the practice followed in the case of Larkins, in all instances of mortification from local injury. I can conceive that a gangrene may arise in an unsound constitution from a comparatively slight accident; so that it may be regarded as the result of constitutional disposition, rather than of the local cause. Amputation would be hopeless under such circumstances. I have in view the mortification following very severe injury, in a subject otherwise healthy; and my present experience does not enable me to go beyond this general statement.

"Mais avant de se determiner à l'opération, il faut être bien sur comme nous l'avons déja dit, que les progrés du sphacele sont arrêtés. Cette precaution, *applicable à toutes les especes de gangrene*, regarde surtout celle qui dépend d'une cause interne."

Boyer, Traité des Mal. Chirurg. Vol. I. p. 120.

CASE VI.

A case, which I saw many years ago, first led me to doubt the propriety of the general rule on this subject. A man underwent a very severe operation for a pulsating tumour in the calf of the leg: an incision was made in order to secure the vessel at the part affected, and was necessarily very extensive. The attempt not succeeding, this incision was continued into the ham, and the popliteal artery tied. Mortification came on in the night, the surgeon immediately removed the limb, and the patient recovered.

Mons. Larrey has given us the result of his experience in what he calls "traumatic gangrene *," in the third volume of his Memoirs on Military Surgery. His evidence is conclusive in support of the propriety of amputation, and his remarks altogether are very worthy of attention. He has seen this kind of mortification reach the trunk and prove fatal in six hours; and, in some instances, where he amputated successfully, on account of traumatic gangrene, on examining the limb after the operation, he has observed the cellular substance changed in its appearance at the place of incision.

* Sur la gangrene traumatique, ou determinée par une cause vulnerante.

Operations performed on persons advanced in years.

We are not very frequently called on to perform the greater operations in old subjects. In deciding on the propriety of using the knife in such cases, it is important to know how far we may trust the powers of nature. The following cases will illustrate the point in some degree.

CASE VII.

Anne Thomas, 57 years old, met with a compound fracture of the leg on the 21st of March, 1813, for which she was received into St. Bartholomew's Hospital. There was a protrusion of the bone, and great discharge, under which she had become extremely weak: her condition appearing very dangerous, and without hopes of recovering the use of the limb, I removed it on the 27th of May, employing the silk ligatures. Although a considerable abscess under the calf of the leg was cut through in the amputation, the wound healed in the ordinary time.

CASE VIII.

John Walton, in his 69th year, was taken into St. Bartholomew's Hospital in March, 1815, for an

affection of the elbow. He hurt the part by a fall in the hard frost of the preceding winter, and had experienced in it, from that time, weakness, inconvenience and pain on exertion, particularly in the motions of pronation and supination. He began to perceive in it a dull throbbing pain in the early part of December, 1814, and in about three months after he found it swell. There was at this time a general tension of the limb about the elbow, with pain, but the joint could be moved freely without inconvenience. Leeches, cold washes, and poultices were employed locally, and the greatest attention was paid to his general health without any effect. The limb was now considerably swoln; the integuments became red, and elastic prominences formed in three or four situations about the joint. These after a time were opened, and discharged a thick semi-transparent fluid, not much unlike turbid oil; but fresh collections formed, the inflammation increased, and his health considerably declined. The part having become gradually worse during the employment for three months of the measures most likely to benefit it, and the constitution now suffering more and more, I proposed amputation to him, although the elbow could still be bent and extended for him without pain. The limb was removed on the 9th of June; four or five arteries were tied with silk ligatures, the parts gently approximated, and covered with a damp cloth for a week; on account of a degree of redness and inflammation in the skin at the time of the operation. He slept

much better after the operation, which greatly benefited his health. In a fortnight, the incision was very nearly healed, and I should have discharged him from the hospital, but for considerations not connected with the state of his complaint.

The disease consisted in that peculiar change of structure in the synovial membrane, first described by my friend Mr. Brodie: the membrane was greatly thickened, of a very light reddish brown tint, granulated and uneven on the surface. This alteration had taken place, where the synovial membrane covers the bone near the edge of the articular cartilage, as well as where it is covered by the surrounding muscles. The cavity of the joint contained a little pus. The ligaments were free from disease, and the articular surfaces also, excepting a small point of ulceration on the head of the humerus. There were three or four small collections of a whey-like purulent fluid, not connected with each other, nor with the joint. The surfaces of these cavities very much resembled in their appearance that of the synovial membrane. With this exception, the muscles and other soft parts were quite healthy.

Dr. James informed me that he amputated the arm of Mr. A—— a surgeon, 68 years old and a free liver, in consequence of an affection commencing in the wrist, and spreading thence over the whole fore-arm. The opinions of some sur-

geons, consulted as to the propriety of amputating in so old a person, of a supposed bad constitution, were adverse to the attempt, which, however, succeeded perfectly, and without any longer confinement than is usual after such an operation in a younger subject.

Ossification of the arteries may possibly interfere with the success of amputations in old persons. Mr. Langstaff informed me, that he had amputated the thigh of a person about 75 years old, in a case of mortification of the leg: all the vessels were so ossified, that they could not be tied so as to stop the flow of blood; and the patient, already much exhausted, died within twenty-four hours.

It seems to be generally supposed that this condition of the arterial coats is incompatible with their union under the application of ligatures; but the following case will shew that this notion must be received with some limitation.

CASE IX.

Amputation of the thigh, where the femoral artery was ossified.

George Macarthy, 59 years old, was received into St. Bartholomew's Hospital, in September 1814, for an affection of the knee, which had ex-

isted 18 months, having commenced with pain, after which it swelled. The thigh was amputated by Sir Charles Blicke on the 5th of May, when the disease turned out to be ulceration of the cartilages. The femoral artery which was ossified, was tied in the usual manner. The stump went on favourably; the ligature came away in the beginning of the fourth week, and at the end of the same week (on the 2d of June), the wound of the amputation being very nearly healed, arterial bleeding took place. This was renewed several times, so that he lost much blood, and I was called to him on the night of Tuesday, June the 5th, while the blood was still flowing. The tourniquet did not command the hæmorrhage. I exposed the artery a little above the point of amputation, where I found it, in consequence of ossification, a hard tube; and I tied it with a common thread ligature, on the drawing of which the vessel cracked. This sensation induced me to apply less force than I should otherwise have done, and consequently to leave a larger noose than usual. This ligature came away on the 24th of June, bringing in its large noose a portion of the arterial coats, which contained a piece of complete bone. There has been no recurrence of hæmorrhage, and the wound is now (July 15th) healed to a mere pin hole.

In an age more advanced than that of the patients I have mentioned, the powers of resistance and restoration seem no longer adequate to sustain

and repair even operations which may be considered to require less exertion of these powers than amputation.

CASE X.

In the month of January, of the present year, I operated for a large scrotal hernia, on Mr. D., of Hampstead, eighty years of age, a patient of Mr. Haines. It had been strangulated less than twenty-four hours, had resisted the judicious employment of the most powerful means, and was attended with such symptoms, as rendered the operation obviously the only means of saving life. The sac contained a large portion of small intestine, most closely girt, and of a dark colour. This was returned; and in the evening the patient got out of bed in the absence of the attendants to the close-stool, and forced out, by his straining, a portion of the bowel. When Mr. Haines came to him, he found two or three feet of the gut protruded, which he replaced. The functions of the bowels were restored; all pain and sickness ceased; and the wound went on well. But the patient, who had led a very active life, and been able, to the time of this occurrence, to walk to London and back, seemed to lose his appetite in consequence of the confinement to bed, which was quite new to him; he gradually sunk, although every circumstance seemed favourable, and died in three weeks after the operation.

CASE XI.

A similar result followed the operation for femoral hernia, which I performed on Mrs. A. 77 years of age, a patient of Mr. Weston of Shoreditch. It had been strangulated for three days, and the bowel was found most closely embraced by the stricture. She died on the twenty-third day, although the state of the bowels, the suspension of the alarming symptoms consequent on strangulation, and the condition of the wound, led us to hope that she would recover.

My friend Mr. H. Earle informed me of an amputation of the thigh, performed on a person more than 80 years old, in consequence of a compound fracture. He died in five days; the stump was just as it had been left after the operation, without any attempt at union.

Castration.

I think it best, in this operation, to remove a large piece of the scrotum with the testicle, which diminishes the surface of the wound: a mass of skin is of no service after the operation, and it becomes very inconvenient from the subsequent tumefaction. I conclude that the painful, unnecessary, and unscientific practice of tying the whole

cord, is now universally abandoned; for the facility with which the spermatic artery may be separately drawn out from the surface of the divided cord (in which manner of proceeding the patient hardly feels the application of the ligature), leaves this practice without excuse. After tying the spermatic artery, and any scrotal vessels that may require it, with fine silk ligatures, the edges of the integuments are to be retained in apposition by two or three sutures, and then covered by a narrow strip of simple dressing. A folded cloth kept constantly damp is to be laid over the wound.

Under this plan I have seen no secondary hæmorrhage, which so frequently occurs in the ordinary method of operating and dressing; the inflammation has been very inconsiderable, and the wound has healed quickly.

Removal of the Breast.

The same plan of tying the vessels is applicable to this operation; indeed to all surgical operations. In these cases too, the application of a few adhesive straps to the wound, and the damp cloths, will be found in general the most eligible mode of managing the wound.

CASES XII.—XIII.

I removed the breast of S. Manessier, in St. Bartholomew's Hospital on the 21st of January, 1815; and, on the same day, that of Mrs. K——, a private patient. Several ligatures were applied in both, and I am not aware that they were discharged. The cicatrices have remained perfectly sound to the present time (July). I have used the silk ligatures in other cases of the same description and the wounds healed favourably; but I cannot speak to the present state of the individuals.

The operation for Aneurism.

Whatever proceeding we may adopt for tying the artery, it is advisable to expose it and convey the ligature round it with as little violence as possible: hence insulating the vessel, passing the finger under it, or taking it between the finger and thumb, are practices that should be reprobated.

After dissecting down to the artery, a slight scratch or incision may be made, through the sheath, close to the side of the vessel. Then, with a narrow aneurism needle, nearly pointed at the end, and made as thin at its edge, as it can be without cutting *, a single silk ligature is to be

* For a representation of this needle, see plate 4.; of which fig. 1. shews the whole instrument in profile, and fig. 2. shews the shape of the point, and the position of the eye. Such needles are kept by Evans, surgical instrument maker in the Old Change.

conveyed round it, the point of the needle being kept in contact with the artery. A needle of this form makes its way easily through the cellular substance, and thus the vessel is detached only in the track of the instrument. I should recommend a middle-sized washed silk ligature, which should be drawn moderately tight; under which circumstances the thread may probably remain permanently on the vessel: at all events, ulceration or sloughing of the external coat will not occur so soon, as when greater force is used in drawing the knot. The ends of the ligature being cut off near the knot, the wound is to be united as a simple incision.

EXPERIMENT I.

I placed two ligatures, one of silk and the other of thread, about an inch apart, on each carotid artery of a dog; the silk was nearest to the heart on one side, and the thread on the other. At the end of a week the wounds had healed, and the tubes were closed at the tied parts. The ligatures were still in their places, those of thread were surrounded by a small quantity of matter, while the silk ones were inclosed by natural cellular membrane.

EXPERIMENT II.

A small thread, and a silk ligature, having been placed on the carotid artery of a dog, and the wound having completely healed by adhesion, the parts were examined in a fortnight, when it was found that the former had made its way through the arterial coats, and lay loose in a small cyst of pus, the latter remained on the artery, and was inclosed by cellular substance without any suppuration.

EXPERIMENT III.

The carotid of a dog was tied with two silk ligatures, and the animal was killed in a month. The threads were still on the artery, and closely covered, as in the preceding instances, by cellular substance. Over the portion of the vessel intervening between the ligatures, there was a knot of a dense substance, of the size of a pea; and on cutting this there was a slight appearance of pus.

EXPERIMENT IV *.

I tied some arteries in a dog, intending to examine them at a distant period; but the animal in a few weeks became very ill, and suffered so much, that it was necessary to destroy him prematurely.

* This was performed since the reading of the paper: as the points proposed to be ascertained still remain doubtful, the remarks originally made on the ligature are left unaltered.

A silk and a thread ligature were applied on each carotid, on the 5th of July. The incision was made along the inferior edge of the sterno-mastoideus, on the left side; and along the superior, on the right. The former healed quickly, but the latter remained open longer. Two silk ligatures were applied to the right, and two of catgut to the left femoral artery, on the 21st of July. The wound did not unite by adhesion on either side: there was some swelling and heat, with a little hæmorrhage on the right side, on the 10th of August. All the wounds had healed perfectly, without any sensible induration or tumefaction, when the animal was hung on the 19th of August.

The right carotid was reduced to a slender fibrous cord, its cavity being completely obliterated, for about an inch and a half. The vessel was enlarged and hard from the obliterated part to the chest. Its coats were thickened and indurated, and the cavity was full of pus. This collection was bounded near the origin of the vessel from the common trunk, by a thin layer consisting apparently of coagulable lymph. In all other respects the parts were quite sound. The left carotid was obliterated for a similar extent. A small knot of indurated substance occupied the place where each ligature had been applied. These were smooth cysts internally, containing the ligatures, without any surrounding pus. The thread ligature was loose; the silk remained attached to the solid cord, into which the vessel had been converted.

Both the femoral arteries were obliterated for more than an inch. No ligature remained on the left side, where all the parts were natural. A small cyst of pus containing one loose ligature, was found over the obliterated part of the tube on the right side.

The animal's death did not proceed from any circumstance connected with the operations performed on the arteries. He breathed with difficulty, became emaciated, had a purulent discharge from the nose, and at last convulsions, attended apparently with considerable pain about the head. The appetite was constantly good. The disorder was inflammation and ulceration of the pituitary membrane: the former extended over the whole surface, the frontal sinuses being full of pus: the latter was confined chiefly to the laminæ of the ethmoid bone.

The foregoing experiments, together with the cases in which the practice of employing silk ligatures and cutting off their ends has been tried in operations on the human subject, and the result of trials on dead arteries, are sufficient to convince us that in the operation of aneurism the method may be considered not only free from risk, but as possessing superior advantages. If it shall be found that these ligatures do not make their way through the external coat of the artery, the security against secondary hæmorrhage is complete. The adhesion of the cut sides of the vessel is

usually sufficient; but this has given way in some cases after the separation of the ligature, and certainly will be the more likely to do so, in proportion as the ligature is detached earlier. Should it appear from more numerous investigations, that the vessel is ultimately completely divided by the thread; still the consolidation of the wound over the ligature will support and strengthen the adhesion of the arterial coats, and all the risk that could arise from external irritation, is certainly obviated. With these views then I should advise the employment, in operating for aneurism, of the smallest twist in its hard state, or of a rather larger size washed; and I should not draw the ligature very tight, to avoid that pressure on the external coat, which might render necessary its subsequent separation.

No opportunity has yet offered itself to me of trying this method in the human subject, but I have twice employed a single very small thread ligature, conveyed round the artery in the way I have described, and drawn very tightly. These cases are interesting, on account of the changes which occurred in the tumours after the operations; and I therefore relate them.

CASE XIV.

I operated on ——— Taylor, a middle-aged man, in St. Bartholomew's Hospital, for an aneurism

between the thigh and the ham, of which the pulsation was obscure, in October 1813; exposing the femoral artery in the upper third part of the thigh, and passing the ligature under it with no more violence than is inseparable from such a proceeding. No local pain or constitutional disturbance followed this operation, after which the patient took no other medicine than a single grain of calomel, while he staid in the hospital. The ligature was detached on the 18th day. The tumour had diminished very inconsiderably when he left St. Bartholomew's; and some months after it was nearly of its original size, although the use of the limb had in great measure returned. In the autumn of 1814, he became unwell; the knee and the lower part of the thigh swelled considerably, and he was again received into the hospital. The cavity of the knee-joint was distended with fluid, and a general tumefaction occupied the limb in the situation of the aneurism. Loss of appetite and rest, and other marks of general irritation accompanied this local disorder. Different means having been ineffectually employed for some time to quiet this disturbance, I thought on very careful examination of the part, that deep seated fluctuation was perceptible in the situation of the tumour, from which the effusion into the synovial membrane of the knee had in some degree withdrawn my attention. Having satisfied myself on this point, I determined on freely opening the part, although there was no prominence, nor redness, and the external covering was thick. Nearly a pint of fluid was dis-

charged, consisting of pus mixed with broken down coagula of blood. The sides of the cavity soon contracted and healed.

CASE XV.

Thomas Parsons, about forty years of age, a coal-heaver, who had been accustomed to hard work, and hard drinking, under which he had enjoyed good health, was received into St. Bartholomew's on the 8th of January, 1814, with a firm pulsating tumour of the size of the fist, just under the left crural arch. He had observed it a fortnight before, when it was about the same magnitude. The whole limb was swelled; he was lame; the pulsation of the anterior tibial artery could not be felt, although it was plain on the other side. I performed the operation on the 11th, by means of an incision through the abdominal muscles, parallel to the course of the external iliac artery, and immediately over it. I turned aside the peritoneum, and conveyed a small round thread ligature under the artery, about an inch and a half above the crural arch, and drew it as tightly as possible. During the operation, while the abdominal muscles were in strong action from the patient's efforts, the peritoneum was forcibly pushed into the wound; but it subsided when these efforts were remitted. Soon after the operation a copious serous discharge wetted all the dressings, the shirt and bed-clothes. The large lymphatic

trunks situated on the artery, which must suffer in the operation, seem the obvious source to which this must be referred. It continued more or less until the fifteenth; after which it was not again seen. The peritoneum never protruded, although there was a troublesome cough, requiring the free use of squill and opium, and even a blister to the chest; there was no pain nor tenderness of the belly; neither was there the slightest appearance of weakness in the abdominal parietes after the complete cicatrization of the wound. A little numbness was felt in the left foot during the night of the 11th; but neither this, nor any coldness of the part was experienced afterwards. The ligature came away on the 4th of February. The temperature of the limb was measured by the thermometer daily for a few days, and the following is a statement of the results obtained. Both limbs were wrapped in flannel, and the thermometer was applied under it.

		The Ham.		The Foot.	
	Before the operation.	Right side.	Left side.	Right side.	Left side.
11th Jan.	Pulse 90.	94	94	72	72
	2½ Hours after the operation.				
	Pulse 80	88	90 sole	68 back	70 65&69
12	96	94	96	90	80
13	—	96	98	94	80
14	93	90	96	82	78
15	72	93	97	88	87
16	87	94	96	—	—
17	—	99	99	89	88
18	75	94	96	89	89
19	78	—	—	89	88

For two or three days before the ligature came away the patient was anxious and fretting. He

complained of pain in the swelling, and fancied he should not recover. The pulse was rather accelerated, the appetite declined, and he rested badly; he grew thinner and his countenance changed; he became very low-spirited, and would almost cry when I spoke to him. The uneasiness about the swelling increased. In a few days the tumour itself was considerably enlarged. The skin first became tense, and then acquired a slightly red tint. The pain now increased; the part felt as hot as fire, so that he could not sleep at night. These sensations were relieved by cold applications, as long as they continued cold. On the 10th of February a small superficial eschar was observed, with an obscure sense of deep fluctuation, the skin not being very tense nor red. On the following day the eschar was an inch in diameter, and bubbles of air escaped at its edge. I made an opening through it, which gave issue to half a pint of the most stinking pus mixed with putrid coagula and bubbles of air. The pulse was at this time 100; the digestive organs were carefully attended to, and the wound of the operation was closing. Lukewarm water was daily injected into the sac to remove the sloughs, and offensive discharge which was very great. These were forced out by pressure from between the muscles, in large quantity, at each dressing. The health recovered immediately after the opening had been made; the sac had completely cicatrized by the 12th of March, and he was discharged on the 7th of April when he

could walk well, although there was still a fistulous opening at the wound, which however closed soon after.

From the evidence now detailed we may, I think, venture to conclude, certainly, that the new method of tying the arteries is free from danger; and, probably, that it is attended with some peculiar advantages. More experience and a greater variety of cases are required, to establish the latter point decidedly; and it is particularly desirable to discover what happens at last with the ligatures. I am convinced that the plan is particularly suited to the operation of aneurism, and wish for an opportunity of putting it in practice. I should feel much obliged to any gentleman who will communicate to me the result of trials in aneurism, in amputation, or in other operations.

TWO CASES

OF THE

TRUE ELEPHANTIASIS,

OR

LEPRA ARABUM.

BY

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PROFESSOR OF ANATOMY AND SURGERY TO THE ROYAL COLLEGE OF SURGEONS, &c. &c.

AND

H. H. SOUTHEY, M.D.

PHYSICIAN TO THE MIDDLESEX HOSPITAL.

Read Feb. 28, 1815.

THE Tubercular Elephantiasis has been so seldom seen in England, that no case of it had occurred under the observation of my friend Dr. Bateman, when he published his practical Synopsis, a work highly honourable to the medical literature of this country, and constituting an important æra in the cutaneous department of Nosology. Having stated to the Society in conversation, some particulars concerning a boy in St. Bartholomew's Hospital,

whose case presented the uncommon circumstances of Elephantiasis occurring in an individual of English parentage, almost beginning in England, and going through its various stages to an apparent cure in this country; and concerning a female patient under the care of Dr. Southey, whom I had twice seen, I was requested by the President to procure for the Society a written account of the disease, as it appeared in these cases. The following narratives have been drawn up by Dr. Southey and myself, in compliance with this request.

CASE I.

Charles Uncle, aged 14, of a dark complexion, with brown hair and dark iris, was admitted into St. Bartholomew's Hospital on the 1st of April, 1814. From himself and his grandmother I learned the following circumstances of his history. His father and the whole of his father's family were English: his mother was born in America, of English parents. They married in England very young, went to settle in America, and had three children born at Augusta, in the United States. The eldest boy and a girl were sent to England young; neither of them ever had any cutaneous complaint. The boy is now alive and in good health; the girl died at the age of sixteen, of consumption after measles. Charles, the youngest

child, having lost his father, was removed in early infancy to New Providence in the Bahama Islands, where he lived till the year 1813. He was obliged by his father-in-law to work hard in the open air, exposed to the weather and particularly to the heat of the sun, receiving a sufficient quantity of food, which he described as being of a coarse kind, the same that was given to the negroes. Among the latter, or among the white inhabitants of New Providence (which is a sea-port,) he never remembers having seen any complaint like his own. In the autumn of 1813 he left New Providence, in perfect health, for England. Being obliged to work in the ship during his passage, he became on one occasion extremely wet, and took a violent cold. He felt himself ill and very drowsy, but his appetite did not fail. In a short time his head and face swelled prodigiously: this swelling gradually subsided, he felt himself better, and tubercles of the skin began to appear in the ears and face; a stiffness of the limbs came on at the same time, and has continued ever since. He arrived in England in the autumn of 1813. The disease, which began in the head, had appeared in various parts of the upper and lower limbs by the month of April, 1814, when he was received into St. Bartholomew's Hospital; but the trunk has always been completely free.

The disease has every where begun with flattened tubercular elevations of the skin, not larger than half a small pea at first, but increasing afterwards,

in some parts to a much more considerable size. Their colour and consistence hardly differed at their first production, from those of the sound skin; but they soon became red, and acquired in some instances a deep tint of that colour, with a rather livid cast. In some parts they remained in this state: in others an abundance of white and small scales was formed. Some of the tubercles cracked and ulcerated; but the ulcerations were not in general deep or extensive: they furnished a matter which concreted into hard crusts, and caused the dressings to stick very firmly.

The progress of the complaint was not attended with pain, except from these fissures and ulcerations.

At the time of his admission into the hospital, this boy's ears, forehead, eyebrows and eyelids, and indeed the whole face were completely occupied by the disease. The ears and other features were greatly deformed: the former exhibited some of the largest and reddest tubercles, and had suffered the greatest alteration of figure. The nose was flattened and expanded laterally; the lips and cheeks swollen; the hair of the eyebrows dropped off; but although the eyelids were tuberculated, even on their edges, the cilia have not been lost. The hairy scalp was never affected, nor has its hair fallen off. The membrane of the palate and the velum palati were tuberculated, but

never, I believe, ulcerated; nor was swallowing impeded. There was no reason to suppose that the bones or membranous lining of the nose participated in the disease. The voice was rather rough and hoarse. The fingers, hands, and wrists, particularly the backs of them, were occupied by numerous tubercles, which reached for a short distance on the fore-arms. A small crop occupied the anterior convexity of the shoulder on each side. The toes and feet were swelled altogether; the under surface red and tubercular. The back of the foot and ankle were affected, and a few scattered tubercles appeared on the thighs.

Whether there was any unnatural fulness in the upper and anterior part of the thigh might be doubted; but certainly there was no decided swelling in the situation of the "femoral tumour," described by Dr. Adams, in the cases of Elephantiasis, observed by him on the island of Madeira. The boy was not aware that any change had occurred in this part, or that it was at all enlarged: and at present there is not the slightest appearance of any swelling. An inguinal gland on each side was rather more distinct than usual,

The condition of the generative organs corresponded with the description of Dr. Adams just alluded to. Not only had their developement been arrested from the time when the disease broke out, but they had actually undergone diminution and de-

cay. The scrotum was shrivelled and seemed empty; the testes could with difficulty be felt; they were soft and about the size of small horse-beans.

His general health was hardly affected, the appetite being good, the tongue clean, the functions of the bowels regularly performed; and he slept well.

During the first part of his residence in the hospital the disease advanced. New tubercles appeared on the ears, face, and hands; the two former parts became greatly swollen, and occupied by painful ulcerations. The incrustations of the discharge occasioned difficulty and pain in the motions of speaking and eating. The ulcerations in the face were never deep: they healed in one part and broke out in another. A few deeper ulcers formed at one time on the wrist; they appeared as if a piece of the skin had been dug out, leaving a smooth red surface.

Of local applications, mild ointments and emollient poultices were the most beneficial, particularly when there was any irritation or inflammation. By loosening the crusts, and softening the parts, they gave ease.

Various internal means were employed, as mercury, antimony, and arsenic. They disturbed his health, which seemed to aggravate the complaint:

this was particularly the case with arsenic. When he left it off, and took sulphuric and nitric acids, he was evidently relieved. Medicines were so obviously inefficacious, to say the least, that attempts at cure by means of the Materia Medica were not continued; and there is no ground for ascribing the modification which the complaint afterwards underwent to its agency. He took acids and tonics for some time, and such occasional remedies as circumstances required. He was allowed a full diet of meat, porter, and wine.

He had a very well marked attack of shingles, (herpes zoster,) accompanied by the usual feverish symptoms, which confined him to bed for a few days. The vesicles extended from the linea alba to the spine, on one side of the abdomen, and were numerous and confluent. He also went through the measles, which he contracted from a patient in the same ward: the disorder was mild.

The Elephantiasis having been for some time stationary, began to decline about the end of December: the ulcerations healed, all the tubercles lessened, and at last disappeared, and the patient was discharged from the hospital on the 2nd of February, 1815. There was at this time no trace of tubercles in the face; but it presented cicatrices, the remains of the ulcerations. The skin had become smooth and soft, excepting so far as its surface was irregular from the scars, and had recover-

ed its natural colour. The features are of course permanently deformed, the lips in particular contracted and turned in, so as to narrow the opening of the mouth; and the cuticle continues to separate from them in dry flakes. Vestiges of the tubercles are visible on the palate and throat, but the uvula is entire. The ears are still thickened and swoln, though much reduced from their former size. The tubercles have disappeared from the extremities, leaving however some cicatrices and roughness of the skin. The toes and soles of the feet are still unnaturally red and swoln, and the legs are altogether tumid, and œdematous towards the lower parts; some indurations are felt in them under the skin.

While this amendment has proceeded on the outside, there is reason to fear that some internal organs have become affected. As the tubercles have disappeared, a cough has arisen, which is now troublesome.

The boy is short-breathed and weak, and his pulse is from 110 to 120. He is also much emaciated. The generative organs continue in the state described.

February 15, 1814.

Charles Uncle went from St. Bartholomew's Hospital to Brompton, where I saw him, after a short interval, labouring under the symptoms of pulmon-

ary affection already mentioned to a considerable degree, and indulging freely in the use of porter, meat, &c. with the view of restoring his strength. I recommended a change of diet, and that he should immediately go into Devonshire, where some of his relations resided. The following is part of a letter from him, dated the 9th of May. "My bodily health is much improved with respect to strength and eye-sight; but I have within a week broken out in three or four places about my face, which I think is merely change of climate. It does not bear the same appearance with the old complaint, as it looks raw when the scabs fall off. I am, according to your advice, placed at a farm-house, where I am comfortable. I amuse myself with shooting, and fishing, and reading." By a letter from his mother, of the 22d of June, I understand that his face continued very bad at that time, and I was informed at the end of August that it was still broken out, although his health and strength were considerably mended. His brother died of consumption about this time.

CASE II.—By Dr. Southey.

In January 1814, I was first requested by my friend Mr. Ashburner, to visit a patient of his afflicted with Elephantiasis. Of the nature of the complaint no doubt could be entertained, as the symptoms were too strongly marked to be mistaken;

and many eminent practitioners both in England and India had agreed in the name, though they had not succeeded in removing the disease.

Miss R—— is at present 22 years of age, she is a native of Bombay, the daughter of an English officer, by a Hindoo woman. When about ten years old, red blotches appeared upon different parts of her body, which by mercurial medicines and other remedies were removed for a time, but recurred at intervals during several years. The elbow and the foot were the parts first attacked by the tubercular disease, which has now existed above five years. These tubercles vary in size, are of a livid colour, and the skin is thickened in their vicinity (indeed upon the feet and hands this thickening of the skin seems to precede their formation): they enlarge gradually with little or no pain, and suppurate. The ulcers thus formed spread along the integuments, laying bare the muscles. The edges of the ulcers are in general high, callous, and jagged. The hands, arms, and legs, are at present nearly covered with ulcerations of this description. The face is also horribly disfigured: the eye-brows have their former situation marked by lines of scurf. The eye-lids are livid and tuberculated, but some few eye-lashes still remain. The alæ nasi are thickened, and the nose quite flat. Dry black crusts, open ulcers, or tubercles advancing to suppuration, cover nearly the whole face. The ears have that thickening of the lobe peculiar to this

disease, and are otherwise enlarged and altered in shape. The lips and tongue are studded with small tubercles, and the tonsils commonly more or less ulcerated. A part of the uvula has disappeared. The voice is hoarse. Small tubercles have also formed on the tunica conjunctiva, one so near the edge of the transparent cornea as to have occasioned an opacity of that membrane, and the left eye is beginning to suffer in a similar manner. The trunk is not affected. All the ulcers have at different times been healed, but fresh tubercles constantly form, and go through the same process. According to the state of the general health, the existing ulcers either spread or put forth healthy granulations. The pulse is always quick, varying from 100 to 120. The appetite is weak and the digestive organs torpid, constant purgatives being required. The menstrual discharge is said to have been tolerably regular in point of time; but it was found by Mr. Ashburner to coagulate upon exposure to air. With regard to the libido inexplebilis, or the absence of sexual passion; it may be proper to state, that an offer of marriage was made to this unfortunate female within the last two years, which she was inclined to accept. I have not ascertained the presence of the femoral tumour, but I understand that Dr. Adams upon examination found this mark of the disease on the left thigh. The breasts have disappeared. Among the many unsuccessful remedies which have been tried in this case, acids and alkalies, vegetable and mineral tonics, arsenic,

dulcamara and sarsaparilla may be mentioned. From some combinations of antimony and mercury, particularly that of pulvis antimonialis with the blue pill, temporary advantage seems to have been derived. Of the local remedies, the alternation of poultices with bandages of adhesive plaister was found by Mr. Ashburner to answer best.

February 24, 1815.

ON

SOME AFFECTIONS

OF THE

LARYNX,

WHICH REQUIRE THE

OPERATION OF BRONCHOTOMY.

BY WILLIAM LAWRENCE, Esq. F.R.S.

PROFESSOR OF ANATOMY AND SURGERY TO THE ROYAL COLLEGE OF SURGEONS, &c. &c.

Read June 6, 1815.

WHETHER we consider the imminent danger of life, or the dreadful anxiety and distress produced by the sense of impending suffocation, no cases are attended with greater alarm to the patient, nor require more prompt and decided conduct in the practitioner, than the diseases of the larynx and trachea, which interfere with the process of respiration. The nature and treatment of some of these are well understood; but others, although they are not rare, have not yet been described and examined with sufficient accuracy, nor in a sufficient number of instances, to admit of their being readily discriminated, or of the appropriate

treatment in each instance being generally agreed on by the Profession. The records of this Society contain some valuable materials for supplying the deficiency just alluded to. The two papers of my friend and colleague, Dr. Farre, in the Third Volume (art. 6 and 19), and that of Dr. Percival in the Fourth (art. 16), describe, under the name of Cynanche Laryngea, an acute affection of the membrane of the glottis, proceeding rapidly to a fatal termination by suffocation. Three cases of a similar affection are recorded by Dr. Baillie, in the Third Volume of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge (art. 22).

In some bodies, which I have examined after death, appearances have been found analogous to those described by the learned physicians just quoted. The patients died of suffocation; but the progress of the complaint was much slower than in those cases, the symptoms were not acute, nor did the inspection of the parts disclose any evidences of active inflammation. The membrane covering the chordæ vocales was thickened, so as to close the glottis, and a similar thickening extended to a small distance from these parts, accompanied with an œdematous effusion into the cellular substance under the membrane. The epiglottis did not partake of the disorder. In one or two instances this thickened state of the membrane was the only change of structure observed; but in others it was

attended either with ulceration of the surface near the glottis, appearing as if it had been formed by an abscess which had burst; or with a partial death of one or more of the cartilages of the larynx; viz. the arytenoid, thyroid, or cricoid. The rest of the air passages and the lungs were healthy. Having within a short time performed bronchotomy in two cases of the kind just alluded to, I shall shortly relate the particulars of them.

CASE I.

M. Cockett, between 40 and 50 years of age, was admitted into St. Bartholomew's Hospital for venereal complaints (not of the throat) in the beginning of November 1814. Mercury having been employed, he became violently salivated, and was removed into a clean ward: he was supposed to have taken cold, became gradually hoarse, and affected with considerable difficulty of breathing. I was led to inquire into his history and symptoms, from the great and peculiar noise of his breathing. He felt no pain in the chest, even from the deepest inspiration, and seemed to draw in the full quantity of air; but it obviously met with some obstacle in its passage, obliging him to sit up in bed, and employ all the auxiliary powers of respiration, and producing a sound audible over the whole ward. His opened mouth, elevated shoul-

ders, and spasmodic struggle of the whole frame, marked the narrowness of the passage for the air; while the cold and pallid skin, the small, feeble, and rapid pulse, indicated clearly enough the general debilitating effects of such imperfect respiration. His voice was very much affected, but he could swallow without difficulty. Pressure on the larynx produced no pain; nor was there any affection of the visible parts of the throat. He was not quite clear in his answers to my questions, and the nurse said that he had talked incoherently two or three nights: she added, that he had been gradually coming to his present state for three or four weeks, and had been for several days in the same condition, the medical treatment, including blisters to the throat, not having afforded any relief. In about four days from this time, the physician, under whose care he had hitherto been, left word for me, that he regarded the case as desperate, that the man would certainly die, whatever treatment was adopted, but that if I wished it, I might perform bronchotomy. I found the patient in the state I have described, except that he was much worse. He was supported in bed in the sitting posture, the mouth opened, and gasping for breath, the eyes wildly staring, and the cold skin covered with a clammy sweat. A beard of two or three weeks' growth, and the accumulated filth of many days completed the picture of wretchedness. I immediately performed the operation, which the patient did not seem to feel: he was talking wildly about

going before the Lord Mayor. A transverse incision between the thyroid and cricoid cartilages did not procure a sufficiently free passage for the air; the latter part therefore, and the neighbouring cartilages of the trachea were cut through longitudinally, and a short tube, consisting of the end of a large elastic catheter, was introduced, but speedily withdrawn, as it caused extreme irritation, and an insupportable convulsive cough. As breathing was not performed freely, I removed a very narrow longitudinal portion of the trachea, containing as thin a strip of the membrane as possible, and left the wound open. He now breathed with perfect ease, and entirely through the artificial opening; all the distress was at an end, the pulse became stronger, he rested tolerably at night, and experienced in all respects a decided amendment. He survived the operation eight days, breathing without the least difficulty through the wound, from which there was a copious excretion, first of a thick mucus, and afterwards of a purulent fluid. He appeared sometimes so well, as to give us distant hopes of his recovery; but latterly he grew restless, particularly at night, though without manifesting any marked accession of symptoms denoting the disease of the chest, which we afterwards found.

The chordæ vocales, sacculi laryngis, epiglottis, &c. were perfectly healthy; their membranous covering, as well as the lining of the trachea, free from every appearance of inflammation; and the

rima glottidis of its natural dimensions. There was a small internal aperture at the back of the larynx, under the glottis, leading into a cavity on the outside of the membrane, which contained about one half of the cricoid cartilage completely bare and loose. This part had previously undergone the change into bone, which the cartilages of the larynx, at least the thyroid and cricoid, usually experience before the age of the present patient.

The chest exhibited extensive marks of recent disease, in adhesions of the lungs to the pleuræ, and effusion of whey-coloured fluid with flakes of coagulated lymph. The lungs themselves were also considerably diseased.

Had the disease of the lungs and their membrane existed, and been known to exist, when the operation was performed, it would probably have been deemed an objection to that measure, unless the relief of the patient from the dreadful feelings of impending suffocation should be considered in itself sufficient to justify bronchotomy.

Are we to conclude that the obstruction to respiration was produced in this case by a spasmodic stricture of the glottis, caused by the irritation of the neighbouring disease? or that the opening had been actually closed by a thickening of its membrane, which had subsided since the operation?

The perfectly natural appearance of the membrane leads me to adopt the former opinion.

The phænomena of asthma, and of other diseases, sufficiently prove that spasm in some part of the air passages is sufficient of itself to cause great difficulty and distress in breathing. The same circumstance is often evident in angina laryngea, the affection of respiration being aggravated in paroxysms, and then considerably diminished. A striking proof of the same point was afforded in the case of a young woman, under twenty years of age, who died in St. Bartholomew's Hospital. Her indisposition was of a fortnight's standing, and consisted in a great difficulty of drawing air into the chest, amounting to a sense of suffocation, coming on in fits, between which she was free from all complaint. Her breathing and pulse were nearly natural, she had no pain, and excepting a degree of debility, produced by the preceding attacks, there was no mark of disease or disorder about her. I desired that I might immediately be sent for on the occurrence of a fit, supposing that bronchotomy would be required. This patient died suffocated on the night following her admission into the hospital. Her disease was an aneurism of the arteria innominata, situated behind the first bone of the sternum, and pressing on the trachea. The front of this tube was pushed in by the tumour, so as to present a convex prominence on the inner surface, which however diminished its area in a very slight de-

gree. All the other parts were healthy. The termination of this case is the more remarkable, inasmuch as in another patient an aneurism rising out of the arch of the aorta and pressing on the corresponding part of the trachea, so as to produce ulceration of the internal membrane, under which there was a slight appearance of coagulated blood, caused no affection of the breath at all. The person died of a different complaint, and the discovery of the aneurismal tumour, which was very small, and filled with firm laminated coagula, was quite accidental. Both the specimens just mentioned, are preserved in the collection of Mr. Abernethy.

CASE II.

Hannah May, about 35 years old, was admitted into St. Bartholomew's Hospital on the 16th of January, 1815. She breathed with great difficulty, and considerable noise; she was obliged to sit up in bed, and employed every muscular exertion that could assist in enlarging the chest. The mouth was open and the eyes protruded; and the sense of suffocation produced great agitation and quickness of breathing. She desired to be fanned, as if to relieve the distressing want of air, and eagerly thrust her head forward to catch it. There was no local pain, no difficulty of swallowing, nor any symptom of affection of the internal organs. A pale and cold skin, rapid and feeble pulse, marked, as in

the former case, the effect of obstructed respiration on the system in general.

The symptoms having become worse, in spite of the medical means employed for their relief, among which blisters to the throat may be mentioned, and the night of the 18th having been passed in extreme agitation, with the constant expectation that the distressing scene would be ended by suffocation, I performed bronchotomy on the morning of the 19th, when I first saw this patient. An incision of an inch in length was made longitudinally through the cricoid cartilage and the trachea: some blood flowed into the trachea from a thyroid vein, and the front of the gland, divided in the operation; but it caused no irritation, and was expelled with the air in expiration: the bleeding soon ceased. She now breathed entirely through the artificial opening, and felt herself completely relieved; the pulse became considerably stronger. A short silver tube was placed in the opening of the trachea, but it would not remain, and it was not thought important to make any attempts with other contrivances, as the patient now breathed freely. I could not see her again until the evening of the following day, when respiration was performed entirely through the wound, but not with freedom. Some viscid mucus was excreted, and impeded the passage of the air. I attempted to remove a portion of the trachea; but, as the horizontal position could not be borne, the wound

was deep, and the patient extremely averse to have any thing else done, and there was no assistance at hand, I did not succeed. Early in the morning of the 21st she died, I fear from difficulty in the passage of the air.

The membrane of the chordæ vocales, sacculi laryngis, and front of the arytenoid cartilages, possessed its natural pale colour, but was thickened and granulated on the surface, so as completely to shut the rima glottidis. The affection, entirely confined to the parts just enumerated, occupied a very inconsiderable extent of the membrane, just enough indeed to close the entrance of the trachea. The rest of that tube, the epiglottis, and neighbouring parts, and the contents of the chest and abdomen were perfectly healthy. A portion of the tube had been cut through longitudinally, at the side of the opening in the trachea, and was nearly detached.

Considering that no part was found diseased in this woman, except a square inch at most of mucous membrane, I cannot but ascribe her death to obstructed respiration; and think it probable the event would have been different, had more complete relief been afforded by the operation.

A case resembling the preceding in many respects, is recorded in the Eleventh Volume of the Edinburgh Medical and Surgical Journal:—A fe-

male, twenty-three years of age, became affected with uneasy feelings about the throat, producing slight cough and dyspnœa, and constant wheezing, in September. Pain of the chest, spitting of mucus, soreness of throat, and hoarseness were gradually added to the other symptoms. Various medical means, including repeated blisters to the throat, were employed ineffectually. The affection of the voice increased, producing a whistling noise, and the breathing became worse; deglutition was performed without difficulty, and there were no constitutional symptoms. "On the 7th of February, the patient paid a visit to some friends about half a mile distant, with whom she spent the afternoon and evening till ten o'clock. She returned on foot, and the air was very cold. About one in the morning, feelings of suffocation came on. Medical assistance was immediately called. It was thought proper to administer repeatedly large doses of sulphuric ether, also to bleed and apply a blister plaster to the external fauces. It was also in contemplation to perform tracheotomy, but the poor sufferer died about five in the evening, seeming suffocated." The trachea and the contents of the chest were healthy; the following is the description of the appearances observed in the larynx. "The trachea being cut out, the larynx was seen stopped up by thickening of the epiglottis, as well as of the membrane lining the larynx, and by a thick fluid, consisting of mucus and coagulated lymph. There was general thickening of the thy-

roid, cricoid, and arytenoid cartilages. The thyroid *gland*, as it is called, with the muscles attached to the cartilages of the larynx, were all enlarged, and purulent matter was formed in the cellular membrane of the muscles. A little pus was seen upon the arytenoid cartilages, and a superficial ulceration." Pages 267 and 268.

Pelletan relates a case under the title of "Engorgement chronique de la membrane du larynx," which, although its duration is not specified, seems to have been a slow affection, analogous to the cases just described. After an attack of fever, which yielded to the ordinary means, a pain in the throat remained, accompanied with difficulty of swallowing, which increased rapidly, and afterwards with uneasiness in breathing. Nothing unnatural could be observed on looking into the throat. Blisters were applied externally, but the disorder gained ground; and the progress towards suffocation becoming accelerated, Pelletan opened the trachea. It was too late, for the woman died the same day. The membrane of the epiglottis was so much swollen, as to give that organ a globular figure. The membranous lining of the larynx nd pharynx was equally swollen, and increased in density. The opening of the glottis was reduced to less than one third of its natural size *.

* Clinique Chirurgicale, tom. i. p. 17.

I have examined after death five cases, if not more, in which the appearances did not differ materially from those just described, and where no operation was performed. Although I am unacquainted with the details of the histories and symptoms of these cases, I know that they were not acute diseases, that there was no stage of active inflammation, and that the patients lived many days after the difficulty of breathing had commenced. In two of them, a middle-aged and a young female, the affection was clearly referable to a mere cold caught by getting wet.

The parts affected in these cases, viz. the mucous membrane and cartilages of the larynx, are not in themselves essential to life: the affection causes death by mechanically obstructing the passage of air into the lungs. Experience has shewn that medical treatment is almost entirely inefficacious; at least, the most active means have produced no relief in the instances which have fallen under my own observation. The only appropriate remedy is the operation of bronchotomy, which by affording an artificial passage for the air into the lungs, supplies the place of the obstructed rima glottidis, until the spontaneous decline of the disease leaves that passage again open *.

* I am aware that the introduction of an elastic catheter into the trachea through the nose, has been suggested and employed by Dessault, in some cases of obstructed respiration. He considers that this plan is not applicable to cases of angina laryngea, on

The most important point is the time, at which the operation ought to be performed; and this should be as soon as the symptoms enable us to determine the nature of the disease. In no case is delay more dangerous; the patient is constantly exposed to the risk of suffocation, which sometimes comes on very suddenly; the difficulty of breathing certainly produces so much constitutional disturbance, and the circulation of venous blood through the brain and other organs, causes so rapid an exhaustion of the vital powers, as are of themselves extremely dangerous.

The following case, recorded in the surgical writings of Dessault, illustrates this subject very strikingly: "In swallowing hastily, a portion of bone passed into the trachea of a child, and produced the alarming symptoms which are usually caused by such accidents. When the surgeon arrived, the symptoms had ceased, and the child was asleep. He awoke suddenly in the evening with a renewal of his sufferings, which ceased again, and came on at intervals. A physician prescribed a potion for the cough. The following day was calm; but in the night the symptoms were renewed with such violence, that the child seemed to be

on account of the mechanical impediment arising from the swollen state of the membrane, and the serious difficulties which may be apprehended from the contact of a foreign body with parts, whose acute natural sensibility is heightened by inflammation and irritation. Œuvres Chirurg. tom. ii. p. 239.

dying, when it was brought in the morning to Dessault. He understood the nature of the case from the narrative of the circumstances, and performed the operation at the desire of the father. The extraction of the body was followed by a momentary relief; but unfavourable symptoms appeared in an hour, and were fatal on the same evening *." The danger of delay is equally shewn in another instance, in which, where the operation of bronchotomy was about to be performed on a patient labouring under the symptoms of angina trachealis, Dessault introduced an elastic catheter into the trachea through the nose. The pain and cough caused by the presence of the instrument soon subsided, the respiration became free, and the patient was greatly relieved. But the fever returned in the evening, and although the air passed freely, the patient perished in the night †.

Similar cases are related by Pelletan. A child five years old, after swallowing a bean, suffered under severe symptoms of suffocation occasionally for four days, and had been in convulsions thirty-six hours, when Pelletan opened the trachea. The foreign body was expelled; and the child, which seemed nearly dead, recovered, and continued better for eight or ten hours, when the convulsions returned and proved fatal ‡. This author has ano-

* Œuvres Chirurg. tom. ii. p. 264. † Lib. cit. p. 240.

‡ Clinique Chirurgicale, tom. i, p. 2.

ther case in which death followed the operation, apparently from the same cause *.

The importance of operating early has been well understood and clearly expressed by that excellent surgeon Mr. Louis, whose remarks, although applied to a more acute form of the complaint than that which I have spoken of in this paper, are so generally applicable to all cases in which the performance of the operation becomes a question, that I shall here quote them: "If this view of the subject had been sooner attended to by the enlightened practitioners of the healing art, the opening of the trachea would not have been proposed as the last remedy in a disease of so rapid and dangerous a character. I think bronchotomy should be employed in the first place. Bleeding, purging, and the other means employed for the purpose of diminishing the tumefaction of parts, whose swollen state impedes the entrance of air into the lungs, cannot act with sufficient quickness, and this makes us lose time when it is of the greatest importance." "The operation may become ineffectual from being too long delayed: the nature of the disease admits of no delay; none, as is well known, destroys the patient more rapidly. Should not the operation then, instead of being regarded as the last resource, be resorted to at first, in order to prevent the accession of those symptoms, which

* Clinique Chirurgicale, tom. i. p. 23.

sometimes bring the patient into a desperate state in a few hours? This point has not been rightly considered. I affirm that bronchotomy, whether we regard the mode of execution, the parts divided, or the consequences of the operation, even if it were performed on a healthy person without any necessity, would not be attended with greater inconvenience or danger than common bleeding*."

Although the latter statement of Mr. Louis is carried too far, we are fully justified in representing the operation of bronchotomy as attended with little pain, and no danger. Wounds of the trachea and larynx occur so frequently, that the records of surgery are full of them, and they must have been seen by almost every practitioner; they are generally more considerable and less favourable in their direction†, than that which the surgeon makes in this operation; yet they heal readily, and are never fatal of themselves. The trachea has often been opened for the discharge of foreign bodies, and the incision has been quickly consolidated‡. Thus the safeness of the remedy, and the complete re-

* Memoires de l'Acad. de Chirurgie, tom. iv. pp. 458, 459.

† The history of a complete transverse section of the trachea, which united speedily, in spite of the injudicious use of sutures, is detailed in the Philosophical Transactions, under the title of "An Argument for the more frequent Use of Laryngotomy;" by Dr. W. Musgrave: No. 258, p. 398.

‡ See Pelletan, Clinique Chirurgicale, tom. i. Corvisart, Journal de Medecine, tom. xii. p. 44.

lief which it affords, furnish further arguments in favour of the early performance of bronchotomy, in addition to those, which are derived from the imminent danger of life.

The inefficacy of medical treatment in certain cases of angina, and the necessity of obviating the danger of suffocation, by some direct means of procuring the passage of air into the lungs, were recognized in the earliest periods of the art. When suffocation is coming on, the eyes protruded as in a person strangled, the face, neck, and throat swollen, but no disease can be observed on inspection; Hippocrates recommends that a tube should be introduced into the throat, for the patient to breathe through *. Galen mentions the practice of cutting into the trachea as having been proposed by Asclepiades, but gives no opinion of his own on the subject †. After advising scarifications of the surrounding parts, in quinsies attended with danger of suffocation, Celsus ‡ states, that if the patient be not relieved, he must be abandoned to his fate: he does not speak of bronchotomy. Oribasius § and Paulus || describe the operation, and distinguish the cases to which it is applicable. The latter speaks from the experience of Antyllus,

* De morbis, lib. iii. c. 10. edit. Chart. tom. vii. p. 586.

† Edit. Charter. tom. ii. p. 379.

‡ De Medicina, lib. iv. cap. 4.

§ See his works in the Art. Med. Principes, ab Hen. Stephano.

|| De Re Medica, lib. vi. cap. 33.

whose writings, if he left any, have not reached us. He judged that he had penetrated the trachea, by the forcible expulsion of air through the wound, and the loss of the voice. Among the Arabians, Albucasis * has spoken of the operation, of which he had been induced to think favourably, by having seen a woman, whose trachea had been cut, so that she breathed through the wound, recover quickly and completely. Avenzoar thought that the trachea might be opened in desperate cases of quinsy; and he made the experiment on a goat: the wound healed without any ill consequence †. Avicenna ‡ speaks of the operation as an ultimate resource in violent angina, which cannot be relieved by medicine.

In more modern times, different writers have described the cases to which bronchotomy is applicable, and the mode of performing it. Casserius of Piacenza has a chapter on this subject in his work "De vocis auditusque organis §;" Habicot ‖

* Friend's History of Physic, in the account of Paulus.

† Friend, Op. p. 498.

‡ See the Venice edition of his works in Latin, lib. iii. fen. 9. tract. 1.

§ Lib. i. cap. 20. De Laryngotomia. The steps of the operation, and the instruments, are delineated in the twenty-second Plate.

‖ Question chirurgicale, par laquelle il est démontré que le chirurgien doit assurément pratiquer l'operation de la bronchotomie, vulgairement dicte laryngotomie ou perforation de la flutte ou tuyau du Poulmon, Paris, 1620.

published a short separate treatise on it; and Mr. Louis has given a "Memoire sur la Bronchotomie," embracing particularly the historical details, in the Fourth Volume of the Memoirs of the French Royal Academy of Surgery.

The operation has very seldom been performed, and we accordingly meet with very few instances of it in the records of medicine. Its result, in the cases where it has been employed, as well as the history of wounds of the trachea, shews us that this tube may be opened without danger, that no unpleasant consequence can be apprehended from the operation itself, and that we should therefore proceed without hesitation to this effectual measure of relief, in the alarming and quickly fatal affections of the cavity of the larynx, included under the term of angina laryngea.

Ant. Musa Brasavola * asserts, in his commentary on one of the works of Hippocrates, that he himself opened the trachea in the case of a patient

* In libros de ratione victus in morbis acutis Hippocratis et Galeni commentaria et adnotationes, Basil, 1541. I have not seen this work, which I cite on the authority of the following passage of Casserius:—"Etenim A. M. Brasavolus, in suis comment. in quartum lib. Hippocr. de ratione victus in acutis, testatur, se propriis manibus, chirurgo quodam non audente squinantici cujusdam jamjam animam expiraturi tracheam incidisse, ægrumque a mortis faucibus, sanitate restituta eripuisse; et non solum hac vice, sed et alias pluries, idem se felice cum successu tentasse scribit." De Larynge, cap. 20.

labouring under quinsy, and on the point of death, and thus saved his life, the surgeon not daring to perform the operation. He adds that he had adopted the same method in other cases with complete success.

Habicot opened the trachea in two cases, which are related in his work quoted above. One of them was that of a young man severely wounded about the throat; the other, of a lad with a large foreign body stuck in the pharynx. They both recovered.

Friend mentions, in his history of medicine, that Purmann has recorded a successful case of bronchotomy, performed in an acute affection of the throat; and that a very experienced surgeon of his own acquaintance, on whose veracity he could rely, had met with equal success from the operation in a similar instance *.

* Purmannus (in chirurgia curiosa) sese operationem hanc in ægro præstitisse narrat, cui tumor atque inflammatio vehemens guttur obsedissent, et strangulationem subitam intentassent. Homo autem, qui et sermonem et mentem amiserat, utrumque paulo post recepit. Et chirurgus quidam, magnæ et experientiæ et fidei, sese eandem rem fecisse mihi ipsi affirmavit; idque is nullo antea apparatu, ne divisa quidem cute executus est; scalpello tantum inter duos ex anulis locum incidit, ac postea spathulam exilem intromisit, cava demum turunda adhibita; unde æger, qui animam eo tempore efflare videbatur, brevi convaluit, multosque postea annos incolumis superfuit." Opera, p. 434.

I transcribe the following case from the Philosophical Transactions, because I think it will be interesting to the Society, as well from the details, which give it a character of authenticity, as from the acute and threatening nature of the attack, the complete relief afforded by the operation, and the perfect subsequent recovery of the patient.

"I was called to a young lad, who being in such a good state of health, as to be making a visit to some of his comrades in another street, was all of a sudden taken ill of a violent trouble in his throat, in which however I could see nothing wrong; the amygdalæ and other parts in view being in all appearance sound enough, but only looking a little drier than ordinary, without any external tumour appearing about the larynx, and no considerable frequency or strength in his pulse. But he had great pain and a dyspnœa, with an impossibility of swallowing either solids or liquids, every thing returning forcibly by the mouth and nose, when he made an effort to get it over. From all which I reckoned it an angina of one of the worst kinds, *sine apparente tumore* (see Hippocr. Prognost. 23, 3, and Prænot. Coac. 3, 96.) and the seat of the disease in the larynx, and the fibres common to it and the top of the gullet.

"Notwithstanding repeated bloodings, blistering betwixt the shoulders, cupping, &c. whereof it is needless to give you a particular detail; the disease

continued so obstinate, and the patient so like to suffocate, that next day in the afternoon his friends though very averse in the morning, when I first proposed the piercing the windpipe, at length earnestly desired that the operation might be performed; and the poor lad bade us to try any experiment to preserve his life. He had good reason to do so, for indeed in all probability, in a few hours, he would have been strangled to death most miserably, *constante mente integrisque sensibus*, as the elegant Fernelius expresseth it, (Patholog. v. 9.) whence you see it was not out of an itching desire of making experiments, or a wanton officiousness, that we directly set about the operation, which was done with such success that in less than four days his breathing being perfectly easy, and his deglutition almost so, we removed the canula and left the glottis to do its own office.

"The patient was soon perfectly recovered: he breathes, speaks, eats, drinks, and performs all the other offices of life, and goes about his calling as formerly. And now I cannot but notice the needless pain some writers are in about healing up the wound by bandaging, stitching, &c. For we found it easily to fill up of itself in very few days, by only dressing it every other day or so with a soft tent made less and less every dressing, and armed in the common way with liniment. arcæi.

"I hear now that Mr. Baxter, a surgeon in

Coupar of Fife, not far from us, and Dr. Oliphant in Gask in Perthshire, did it with very good success within these few years*."

René Moreau, in answer to a letter of Bartholin, informs him that he had twice resorted to the operation of bronchotomy, "first in a gardner, who still enjoys good health, and then in a soldier, who recovered from the disease and the operation with no other inconvenience than a slight degree of hoarseness †."

Two cases in which the operation was successfully performed, are mentioned without any details in the Memoirs of the French Academy of Surgery‡. Garengeot § speaks of a lad attacked with a violent quinsy, and completely relieved by bronchotomy.

In the Journal de Medecine for December, 1765 ‖, we meet with the history of a successful case of bronchotomy, in which a woman, aged 35, was seized with an affection of the throat, for which

* The postscript of a letter from G. Martin, M.D. to W. Græme, M.D. F.R.S. giving an account of the operation of bronchotomy, as it was performed at St. Andrew's. Phil. Trans. 1730, No. 416, Art. 5.

† Th. Bartholin, Epist. Med. Cent. i. ep. 81.

‡ Tom. iii. p. 12.

§ Traité des Operations. Tom. i. c. 31. p. 489.

‖ Tom. xxiii. p. 559.

bleedings, &c. were of no service; she was on the point of suffocating on the 6th day, respiration being performed with a noise (*râlement*) that could be heard to some distance. The wound was cicatrised on the 10th day.

A case of violent quinsy, threatening suffocation, in which there was no apparent disease about the fauces, is related in the Journal de Medecine, &c. for July, 1772. The trachea was opened between the third and fourth cartilages, and a piece of quill introduced for the patient to breathe through; the symptoms of suffocation immediately ceased, and the author adds with exultation, "c'est là ce qu'on peut appeler *medicina efficax*." This case proves at least the little hazard attending the operation, as the patient came to see his surgeon on the fourth day after it had been performed *.

* Journal de Medecine, &c. tom. xxxviii. p. 358. The relator mentions three other cases, which, by their speedy termination, shewed the inefficacy of the ordinary methods. "L'exemple du Sieur Pontneuf, ancien maire du Croisie, qui mourut, en trente-six heures d'un violent mal de gorge, ou d'une semblable esquinancie, malgré les saignées et les secours les mieux indiqués; un homme qui entra à l'hôpital au mois de Janvier, 1771, et une femme dans le mois suivant, tous deux attaqués de cette même maladie, et qui y perirent en vingt quatre à trente heures, ne me donnoient aucune confiance dans les saignées brusquées, les cataplasmes emolliens et calmans, les gargarismes adoucissans, les injections de ces mêmes gargarismes, les lavements, les scarifications, tous employés sans succés." p. 362.

Flaiani * performed the operation twice; in one instance it was too late, in the other the patient was restored.

In the Third Volume of the Transactions of this Society, we have the case of a boy five years old, who was attacked with cynanche trachealis, and ready to perish from suffocation, the ordinary treatment having been ineffectual; when the trachea was opened by a transverse incision between its cartilages, with the greatest relief at the moment, and subsequent complete recovery †.

A few cases are recorded, in which death has taken place after the operation of bronchotomy. One of them occurred to Flaiani, and has been already noticed; Garengeot ‡ mentions that a patient of Arnaud's died on the 7th or 8th day after bronchotomy had been performed, but the particulars from which we might form an opinion about the cause of death are not given; and lastly, we have a very interesting history and dissection of a fatal case by Dr. Percival, forming the 16th article of our 4th volume. In this case of acute cynanche laryngea, the operation performed on the evening of the third day not only rescued the patient from impending suffocation, but evidently prolonged his

* Collezione d'Osservazioni, Tom. iii. Oss. 57 & 58, referred to by Ploucquet, under the head Angina.

† Note to p. 335. ‡ T. i. c. 31. p. 489.

life, so that the natural passage became sufficient for respiration. But notwithstanding the latter favourable circumstance, the sympathetic disturbance of the constitution, excited by the acute affection of a part so essential to life, concurred with the effects of a very active treatment, required by the alarming nature of the symptoms, to induce a fatal termination on the 4th day after the operation. The intelligent narrator justly infers from this case "the expediency of resorting early to the operation of bronchotomy, before the lungs are thrown into a disordered condition; and before the general powers of life are exhausted by the laborious and imperfect exertions of this vital organ."

The facts which have been related and alluded to in this paper, seem to me to justify the following conclusions, viz.

1. That the larynx is subject to affections differing considerably in the nature of their symptoms, and in their progress; but resembling each other in their ultimate effect, of obstructing the passage by which air is received into the chest.

2. That the difficulty of breathing amounting to a sense of suffocation, the sound produced by the passage of the air, the affection of the voice, which is either extremely hoarse or reduced to a scarcely audible whisper, in many cases pain of the throat, and difficulty of swallowing, together with the ab-

sence of symptoms indicating affection of any other organs, are the signs by which this obstruction may be recognized.

3. That the impeded state of respiration causes a violent constitutional disturbance in the acute cynanche laryngea, while it has a general debilitating influence in the more chronic forms of the disorder; and that these effects are in themselves fatal, after a certain time, even if the original obstruction be obviated.

4. That local and general bleeding, blisters, and the various internal means are usually inefficacious.

5. That the operation of bronchotomy, by providing an artificial opening for the air, produces complete relief, but, for the reasons mentioned under the third head, it is ineffectual, unless performed very early.

6. That the operation is free from danger, has been many times successfully performed, and has not in any instance produced unpleasant consequences.

The operation itself is so simple and easy that there is very little to be said on the mode of executing it. Of the three situations in which it has been proposed to make the opening, viz. in the thyroid cartilage, between that and the cricoid, or

in the trachea, I consider the first as the least eligible. Besides the objections from the ossification of the cartilage, and the danger of wounding or otherwise injuring the chordæ vocales, there is the inconvenience in the case of angina laryngea, arising from the swoln and thickened state of the membrane, which may actually impede the passage of the air. I am not aware of any objection to a transverse opening between the thyroid and cricoid cartilages. The prominence of the former in the neck, serves as a guide to the part which should be opened. The only sources of embarrassment in the two cases I have related, were the very considerable and rapid motions of the larynx accompanying the obstructed respiration, and the necessity which the patients felt from the same cause, of keeping the head erect. When the air tube has been opened in this part, a short flattened canula, curved so as to correspond to the axis of the trachea, should be introduced. In some instances this has been borne quietly in the trachea, while in others it has produced so much irritation, cough and sense of choking, as to render its immediate removal necessary.

Under the latter circumstances, I should advise a longitudinal incision, of about half an inch, in the middle of the trachea, and the removal of a thin slip of the tube, which will leave an artificial opening for respiration, equal in size to the natural one.

If there should be troublesome hæmorrhage from any branch of the thyroid artery, or from a thyroid vein, the bleeding vessel ought to be secured before the trachea is opened.

I subjoin the particulars of two cases, in which bronchotomy was performed for laryngeal affections threatening suffocation, since the foregoing paper was read to the Society. One of them was a patient of mine in St. Bartholomew's Hospital: the other was under the care of my friend Dr. P. Latham, in the Middlesex Hospital. In presenting to the public the latter important communication, I have great pleasure in acknowledging the kindness and liberality with which Dr. Latham made me the unsolicited offer of this interesting case; and I only regret, as my readers will, that his subjoined observations are so short.

CASE I.

David Jones, of Crooked Billet Yard, Kingsland Road, 53 years old, who earns his livelihood by crying boxes and other articles about the streets, and had never been the subject of any similar attack before, became affected on Friday June the 24th with hoarseness, so that he spoke gruffly, and with slight pain in his throat. He did not complain in other respects, though he thought

proper to suspend his ordinary employment, fearing it might aggravate this hoarseness, and to take some opening medicine. On Friday the 7th of July, he began to experience a difficulty of breathing, and, to use his wife's expression, *to hoop;* that is, to draw his breath with a peculiar sound. The voice was still more affected, and reduced to a kind of whisper. He was bled and purged on the 8th. At one in the morning of Wednesday the 12th, he again became much worse: the difficulty of fetching his breath was so great, that his wife said he was like a person running mad, not remaining quiet for a moment, but walking and moving about incessantly. Yet he particularly observed that this was his only grievance; and that if the stoppage in his throat could be removed, he should be well. He took an emetic, of which the operation rather relieved him; a very large blister was applied to the chest, and the whole throat was covered by another. The difficulty of breathing still increasing, in spite of the full action of these blisters, and the danger of suffocation being extremely urgent, he was sent by Mr. Parkinson, of Hoxton, to St. Bartholomew's Hospital, where I saw him at six in the evening. The distress of breathing was extreme; every inspiration performed with great effort, and the assistance of all the auxiliary powers, was attended with a loud hooping noise, audible across the hospital square. He sate up in bed, shifting about incessantly to get breath, and agitated by the momentary expectation of suffocation; the occurrence of

which, without some immediate relief, seemed close at hand. Sweat poured down in streams from the whole body: the pulse was 120, full, strong, and intermittent. He had no difficulty nor pain in swallowing, and felt no inconvenience from fully distending the chest. There was a little coughing occasionally, excited by a colourless mucus about the larynx. Judging from the circumstances just detailed, that the affection was confined to the opening of the larynx, and that the source of the patient's danger was a mechanical impediment to respiration, which bleeding and other evacuations, although fully justified by the state of the pulse, could not be expected to remove, I immediately determined on bronchotomy, receiving in this determination the sanction of my friends Mr. Wheeler, the apothecary of the hospital, and Mr. Langstaff, who kindly favoured me with their assistance. I made a perpendicular incision, cut through the cricoid cartilage, and neighbouring part of the trachea, and removed a sufficient portion of these parts to leave a free opening for respiration. The blistered state of the skin, the depth of the parts in a short and thick neck, the rapid motions of the larynx, and the entrance of blood into the tube from vessels divided in exposing it, produced greater difficulties in the operation, than a person would expect, who formed his opinion from the ease with which it is accomplished in the dead subject. Two small arteries bled freely: one of them was tied, but the other could not be

secured, on account of its lying completely under the edge of the cricoid cartilage: it was therefore left, the patient bending forwards that the blood might not flow into the trachea. He breathed quite easily through the artificial opening; all the agitation and distress ceased; the skin became cool, and the pulse softer. Soon after he had some sleep, but did not rest much during the night. He took a saline mixture with small doses of the tartrite of antimony. The pulse was rapid, and intermittent for two or three days, but he was free from fever. Breathing was performed entirely through the wound, and the voice consequently was completely lost. There was a copious mucous and purulent discharge from the trachea and wound. On the 21st he was sufficiently recovered to get up: by holding the edges of the wound together, he could breathe through the larynx and speak, but there was still a feeling of difficulty, which made it necessary to open the wound again in a short time. The 5th of August was the last day, on which any air came through the wound, which had completely cicatrised on the 10th, when he was discharged from the hospital perfectly recovered, excepting that the voice still remained rough and hoarse.

CASE II.—Communicated by Dr. P. Latham.

"On Tuesday the 1st of August, among the patients who presented themselves for admission at

the Middlesex Hospital, was Hannah Donovan, æt. 34. She was seated upon the ground with a number of her friends standing around her, who fancied she was dying. She was breathing with great labour, and with a hoarse and croaking sound, audible to a considerable distance; and in her countenance she exhibited much distress. When interrogated respecting her complaint, she answered with difficulty, and in a voice interrupted by convulsive catches, not being able without some effort and address to obtain breath sufficient to articulate. She referred to her chest, and particularly to the upper part of the sternum, as the situation where she felt great oppression, and being desired to place her finger on that part of the throat where she felt pain, she laid it on the thyroid cartilage. She could swallow fluid only in the smallest quantity at once, and with great difficulty; of solid food she had taken none for some days. Respecting the history of her complaint it was not easy to obtain a satisfactory account, for she and her friends were of the low Irish, and each gave a different answer to most of the questions which were proposed to them. Thus far, however, they seemed tolerably agreed, that she had been hoarse during some months; that she had been worse during the last three weeks, and that the symptoms had subsisted almost in their present severity during three days. Her pulse was full and strong, and 112 in a minute; she had considerable heat of skin, probably owing to the exertion she made, for

it could not be regarded as the heat of fever, inasmuch as the tongue was perfectly clean, which was probably a sufficient evidence that the disorder was not of the acute kind. Not the least appearance of inflammation or tumefaction was discernible either in the tonsils, or any part of the internal fauces within view. Upon the whole, however, it was thought best to take blood from the arm, to apply a dozen leeches to the throat, and afterwards a blister; to order some purgative medicine to be taken immediately, and small doses of calomel, antimony and digitalis, every four hours. Before the prescribed quantity of blood was taken from the arm, she fainted, and in the act of recovering she vomited and seemed somewhat relieved. In the evening the blood that had been taken, the operation of the purgative medicine, and one dose of the powders, had in no degree relieved the symptoms. She seemed to be using all her efforts to prevent strangulation. Her strength however had not visibly declined since the morning; her pulse was not diminished in force, or increased in frequency; nevertheless considering that the symptoms were not such as characterise acute inflammation, I saw no warrant for taking more blood from the constitution, and contented myself with an attempt to render more tolerable the distressful symptoms of a disorder which seemed beyond the possibility of cure. With this view the patient was ordered to take thirty drops of tincture of opium, and those in attendance were enjoined to repeat

the same dose two or three or more times during the night, if it seemed necessary.

On Wednesday morning she was almost exhausted by the labour of respiration. She had been delirious during the night, and had obtained no rest. Her countenance was become pale, and its expression of anxiety was much increased. The pulse was weaker and more frequent, and her ability to articulate was almost gone. Under these circumstances the operation of bronchotomy seemed to present itself as the only method whereby the patient could be rescued from certain death, and with this view I could not satisfy myself without pressing its adoption. At a consultation however in the course of the day, the medical gentlemen of the hospital did not deem it advisable. I saw her in the evening, when it was to all appearance probable that she would die in the course of the night. On Thursday morning I came early to the hospital to inquire the state of my patient, and found that Mr. Charles Bell had in the night performed the operation, and that she was still alive.

The operation consisted in a division of the cricoid cartilage in front, and no sooner was it completed than she seemed at once released from an insufferable load of misery. Her head sank backwards, and she fell into a profound sleep so instantaneously, that she was at first thought to be dead. Whence it may be calculated how near she had ap-

proached to the last degree of exhaustion, and how great was the relief afforded by the operation. The patient (it was hoped) was now placed in a condition to endure her disease, while it passed through the natural process of its reparation and decline, if fortunately it should be in its nature remediable.

After the operation however, a difficulty presented itself in the adaptation of an instrument to the purpose of keeping the edges of the wound asunder. The insertion of a tube was quickly found to be impracticable, and a silver wire bent into an accommodation with the sides of the aperture served as a temporary expedient until one more suitable was devised. The instrument employed afterwards consisted of two branches connected by a hinge, and of a flattened figure: these were inserted in the wound (of the external parts, not the trachea,) and separated from each other, or approximated, by means of a screw, which passed through their extremities out of the wound. When the ends in the wound were separated, the sides of the incision were kept asunder, and the instrument remained fixed in its place: by approximating them it became loose, and could be removed.

During many days the state of the patient was too precarious to allow the most sanguine to cherish an expectation of her recovery. The matter which was perpetually accumulated in the aperture, and the constant necessity of cleansing the wound, and

of withdrawing and reinserting the instrument, unavoidably produced and maintained the severest irritation and pain. Under these circumstances she was at intervals reduced for a time to the same degree of suffering, as previously to the operation. For the mucus, which was secreted with great rapidity in the bronchiæ, and raised by cough into the larynx, adhered to the instrument and to the edges of the wound, and served to diminish and almost to occlude the aperture. Hence a severe struggle commenced to overcome the obstacle which plainly threatened strangulation. These paroxysms returned at first several times in an hour, and as the secretion of mucus was diminished, less frequently. But to the last they continued to recur at more distant intervals, and occasioned such terror and perplexity to the patient as to fill her with an apprehension of death, every time they returned.

After the lapse of a fortnight, although there was little abatement of the severity of the occasional paroxysms, her constitution was less under the influence of permanent irritation. She began to believe it possible that she might recover: her mind became more tranquil, and her countenance cheerful; she enjoyed sound repose, and, when the trachea was not obstructed with mucus, and the aperture was free, her respiration was almost inaudible. Her favourite posture, in which she seemed to have the greatest comfort from facility

of respiration when awake, and in which she was always observed to sleep, was that, wherein the trunk is bent forwards upon the knees, and the head reposes upon the support of the hands.

At the completion of the second fortnight, it was time to expect some evidence of progressive amendment in the disease of the larynx. But this organ had not at all resumed its functions, and if any change had taken place in the disease, it was probably for the worse. She was still unable to articulate, and when the aperture was closed she struggled for breath. Besides she had become generally more irritable; she suffered more severely from tightness and oppression across the chest, which was relieved for a time by blisters, and then quickly returned. A tough mucus lingered in the bronchiæ, and was dislodged by long strainings and cough. Expectorant medicines brought little alleviation, and short intervals of ease were purchased by long struggling to rid herself of that which seemed to threaten her life. Her existence was certainly prolonged during many days by the assiduity and attention of Mr. Heath, the Apothecary of the house, who was hourly present with her, and who during her paroxysms, by means of a probe, covered at the point with cotton, cleared away the mucus that entangled itself with the instrument, and thus set her respiration free. On the night of the eleventh of September she was seen struggling in a severe paroxysm, and before

assistance could be procured she expired. The lungs were inflated, and every other method was employed which was calculated to resuscitate suspended animation, in vain.

Upon dissection, the mucous membrane, where it lines the larynx, and extends over half the posterior surface of the epiglottis above, and to about an inch beyond the cricoid cartilage below, had assumed for the most part a thick and puckered condition, and had partially thrown out coagulable lymph of a stringy and fimbriated texture, which obliterated the ventricles of the larynx, and contributed almost to close the rima glottidis. There were found besides, two distinct ulcerations through the substance of the thyroid cartilage, which contained pus, and communicated with the cavity of the larynx. The lungs, trachea, and its ramifications were healthy; the opening into the larynx was a little on the left of the tube just below the thyroid cartilage, and on the upper edge of the thyroid gland; which latter seemed to have been slightly included in the incision.

The preceding case is not by its unfortunate result rendered less worthy of being recorded. For laryngeal diseases, both chronic and acute, are by no means unfrequent; some of them defy all ordinary methods of cure, and we must be content either to acquiesce at once in the patient's death, or employ bronchotomy as the sole resource.

Under such circumstances therefore it is desirable to know with what probability of success an operation apparently so formidable can be recommended. As this is a question to be determined by the experience of many particular cases, and the instances upon record wherein bronchotomy has been performed are not numerous, I should not have thought myself justified in withholding this.

To vindicate the propriety of the operation it is enough to know the situation of the disease; for neither the history nor the symptoms will be sufficient to fix its precise nature, which must be left entirely to conjecture. The larynx may perhaps be subject to a variety of diseases, but its structure and sensibilities perpetually oppose themselves to an accurate distinction of the symptoms which are proper and peculiar to each. The distinction of the cause will be lost in the magnitude of the irritation, so that whether there be inflammation of the membrane, or ulceration of the cartilages, or abscess in the cellular substance, or accidental lodgement of an extraneous body, the symptoms will probably be the same."

I think it will be allowed that the case of Jones completely confirms the opinions I have ventured to deliver concerning the utility of bronchotomy, when performed in an early stage of these complaints. The different result of Donovan's case, particularly after the favourable appearances ex-

hibited in some parts of its progress, leads us to reflect on the causes of such a difference. Although the operation was longer delayed in the latter instance, and the artificial opening was less free, insomuch that an enlargement of it became necessary at some distance of time from the first operation (a particular which Dr. Latham has not mentioned in his narrative,) and that the mechanical means necessary for distending the wound produced considerable local irritation, affecting the very seat of disease, yet the death of the patient must I think be ascribed to an original difference in the nature of her affection: a difference, which for the reasons so well pointed out by Dr. Latham cannot be recognised by the symptoms. We have already seen that different affections are discovered after death, in patients whose symptoms, derived from the interruption of the respiratory and vocal functions, which is an effect common to them all, exhibited no diagnostic difference; that in some there was a mere thickening and change of structure in the membrane, while in others the cartilages were diseased. We may be allowed to conjecture that Jones's disease was of the former kind; while we know from dissection that Donovan's was of the latter.

EXPERIMENTS AND OBSERVATIONS

IN ORDER TO

ASCERTAIN THE MEANS EMPLOYED

BY THE

ANIMAL ECONOMY,

IN THE

FORMATION OF BONE.

By JOHN HOWSHIP, Esq.

COMMUNICATED BY

DR. ROGET.

Read Feb. 14, 1815.

THE following inquiry was principally suggested by the very beautiful results of the elaborate series of experiments on the composition of Bone and Cartilage, by Mr. Charles Hatchett; and the interesting nature of the subject engaged me to pursue it to the extent I have done.

In order to obtain correct representations of whatever might appear curious in the minute structure of parts, I constructed an instrument on the principle of the solar microscope, by the assistance

of which I was enabled to trace with perfect accuracy as many figures as I thought necessary.

§ I. ON THE FORMATION OF THE CYLINDRICAL BONES OF ANIMALS.

Examinations of the Human Fœtus.

Exam. 1. An embryo eight weeks old was prepared by spreading out the limbs upon slips of glass, and allowing them to dry.

Upon examining these by the compound microscope, the following appearances presented themselves. Rings of bone had been formed in the situation of the metacarpal bones, and of the first and third phalanges. The diameters of these pieces of bone were much larger in proportion to the length of those parts of the limbs within which they were forming, than at the future stages of their growth.

This was most evidently the case in the bones of the hand and foot: it appeared to be a provision for admitting of a considerable increase to the length of the cylinder, before it became necessary to enlarge its diameter.

The soft parts in the situations of the joints, consisted of a yellowish transparent gummy matter*,

* See Fig. 1.

in which no appearance of cartilage could be discerned.

Exam. 2. In the embryo ten weeks old, the extremities of the bones were found connected together by a cartilaginous substance. The rings originally formed, having in the mean time gradually increased in length, had now reached the cartilaginous portions at the extremities. The cartilage connected to the upper end of the bone of the arm was divided into thin sections for examination under the microscope. Several irregular cavities were discovered in the substance of the cartilage, filled with a mucilaginous fluid. In one of these sections a smooth cavity was detected, which extended into an even canal or tube, passing down to the surface of union, between the cartilage and the bone*.

Exam. 3. An embryo about thirteen weeks old, was injected with size and vermillion, and afterwards examined. The cavities within the cartilage, as well as the cancellated parts of the bones, had received the injection freely, but the parts were still too minute to admit of any satisfactory conclusion being drawn from the examination.

Exam. 4. A fœtus of seven months was finely injected, and sections from the cartilages and ossifying surfaces of the thigh-bone were examined by

* See Fig. 2.

the microscope. The cartilage had acquired a comparative firmness in its structure. All the cavities were now formed into canals, traversing the substance of the cartilage in various directions, and several of the largest passed down to the surface of ossification.

In all the sections the ossifying surface was observed to have received a slight tinge of colour, from the general diffusion of the finer particles of the vermillion*.

Exam. 5. Sections from the cartilage of the lower end of the thigh-bone of a child at birth, were next laid in the field of the microscope. A great number of tubular canals were found, many of which terminated immediately upon the surface of ossification. Every canal was filled with a peculiar colourless glairy or mucilaginous fluid.

The edge of the newly formed bone, examined with a strong magnifying power, exhibited an appearance of small short pointed villi, shooting forwards from the surface of the bone into the substance of the cartilage. These villi were only sufficiently opaque to be just visible when a strong light was cast upon them.

All the sections exhibited an apparent alteration in the texture of the cartilage, upon the surface

* See Fig. 3.

connected with the bone. In many instances the cartilage seemed to be more opaque here than elsewhere, this slight opacity forming a line equal to one-twentieth of an inch in breadth.

Exam. 6. In order to ascertain more clearly the primary arrangement of the ossific matter, the lower extremity of the thigh-bone of a child three weeks old was macerated and cleaned. A longitudinal section of the bone was then made, and the surface of the section, including the margin of ossification, pared very smooth with a knife. The piece was afterwards calcined, with a view to remove the remaining animal matter.

In the examination of this, and many successive sections of a similar description, it was observed that in proceeding from the middle of the cylindrical bones, where the medullary spaces are larger, and the cancellated structure stronger, towards the more recently formed extremities of the bone, the ossific masses become more numerous, of a lighter substance, and a thinner texture; the same gradation being continued up to the margin of the newly ossified surface, where the structure is most curiously wrought, and so exquisitely fine as scarcely to admit of description.

From these examinations it was ascertained that the first and earliest state in which the particles of ossific matter become apparent, after they have

formed a mass by their cohesion, may be considered as an assemblage of the finest and thinnest fibres, moulded into the form of short tubes, arranged nearly parallel to each other, and opening externally upon the surface connected with the cartilage. These tubes appeared to correspond in their number to the villi noticed in the last examination. They presented at the surface the appearance of numerous foramina, similar to the smaller set exhibited in Fig. 4. The larger set of foramina seen on the same surface, apparently corresponded in number and situation to the canals already described as existing at an early period in the cartilage, and extending into the bone beyond the surface of ossification.

Exam. 7. In order to observe the changes that occur towards the latter periods of growth, sections were taken from the lower end of the thigh-bone; these were selected from subjects of various ages, and the following were the appearances under the microscope.

In a child eleven months old, the canals within the cartilage were very few in number. At the age of four years these canals were still more thinly scattered, and those that were observed were of comparatively small diameter. When the sections became partially dry, a line one-sixteenth of an inch in breadth, was seen towards the margin of ossification, where the particles of the cartilage had

apparently taken on a new arrangement, so as to resemble parallel lines or fibres. This curious circumstance has been noticed by Haller *.

At the age of eleven years the cartilaginous canals were found to be still diminishing, both in point of size and number; and in the examinations made at seventeen years, it was with great difficulty that a section could be found in which there was any remaining trace of them.

Examinations in Quadrupeds.

Exam. 8. Sections taken from the cartilages and ossifying extremities of the bones of the slink or fœtal calf, were examined in the microscope. The cartilaginous canals were found to be very numerous. They were all filled with a clear mucilage, and the sides of the canals in many parts of the cartilage had the appearance of being stained with blood, although no distinction of blood-vessels could be detected in any of them.

By a series of these examinations it was ascertained, that the cartilages upon which the flat bones of the scapula and ilium are produced, possess a similar organization to that which obtains in the cylindrical bones.

* Prim. Lin. Physiolog.

The posterior extremities were injected with coloured size, and the cartilage then examined in sections, under the microscope. The membranes covering the cartilages and bones externally were beautifully injected; the canals within the cartilage also were equally well injected. Wherever the canals appeared, they were observed to have received the vermillion.

Several oblique sections of canals fell under observation, and in these a membranous lining was very readily discerned, the injected state of the parts rendering the divided edge of the membranous tube very obvious. In some instances this membrane became still more evident, by its having been partially separated from the divided edge of the canal.

Where the canals were found to be divided longitudinally, the membranous lining was in general still attached to the sides of the tube, and the beautiful appearance of the injected membrane was rendered still more brilliant by the abundance and crystalline transparency of its natural mucous secretion.

In many parts of the cartilage where the lining of the canals was finely injected, there was still no appearance of distinct vessels, although in those canals that were opened at their origin upon the external surface of the cartilage, a distinct artery

full of the injected matter might generally be traced, passing inwards to some extent.

In the more internal canals, the usual appearance of the membranous sheath under the microscope was such as it would have been if the injection had passed out from the vessels, and become dispersed in the cellular texture of a fine membrane: had so peculiar an appearance arisen from the accidental rupture of the coats of the arteries, the injected matter must have been detected in masses, which was not in any instance the case.

In those canals that were divided obliquely, the finely and equally injected membrane had the appearance of an uniformly scarlet tube; and by increasing the magnifying power to a very high degree, the individual particles of the vermillion not only became visible, but were seen most distinctly; they were every where found to be very thinly and evenly scattered, indicating the most equal dispersion of the colouring matter throughout every part of the membrane.

In prosecuting this part of the inquiry, a considerable difficulty at first arose out of the following circumstance. The heat of the water in which the preparation was laid previous to its being injected, had so far loosened the membranes from the sides of the canals, that in the subsequent operation of dividing the cartilage into sections, they

were torn from their natural situation, and were consequently found in many parts more or less collapsed. These collapsed membranes had under the microscope very much the appearance of injected arteries, and were at first considered as such, but subsequent and more attentive observation soon enabled me to correct this mistake.

Exam. 9. Sections taken from the cartilages of the thigh-bone of a calf, three weeks after birth, were examined by the microscope, and in order to preserve, as far as possible, the natural appearance of the parts, the blood had been previously coagulated by the application of a heat of boiling water.

The cartilaginous canals were large and numerous. The membranous sheaths also were very distinctly seen. In many of the sections the red blood in the fine structure of the membrane, was evidently continued forward by an extension of the canal for some distance in the bone beyond the surface of ossification.

In order to trace the exact appearance of this ossifying surface, a small cube was cut out from the bone, and calcined. This piece of bone placed in the microscope afforded very distinct appearances. The large canals were seen entering, some at right angles, and others more or less obliquely into the ossifying surface; the intermediate spaces

being perforated by an infinite number of small foramina *.

A similar cube from the femur of the ox, was found on examination, to retain no one character of the above appearances: the surface of the bone beneath the cartilage being uniform and compact in its structure, and without any appearance of the foramina above described.

Exam. 10. In the sucking-pig, the kitten, the young rabbit, and the fœtal lamb (examined at two periods of its growth), the appearance of the cartilages and ossifying bones was in every respect precisely similar to those above-mentioned.

Having thus seen that in the human body, the ox, the sheep, the rabbit, the cat, and the hog, the same purpose of ossification is accomplished by one and the same means, a question naturally occurred, whether the rule might not be a general one, and whether it did not apply also to the larger species of the mammalia?

The cartilages of the whale and elephant, however, are not easily obtained during the progress of their growth; but upon reflection it appeared, that if by examining the surface of ossification the osseous portions of the canals were clearly made

* See Fig. 4.

out, we might fairly infer the existence of the corresponding tubes in the cartilage at an earlier period.

Exam. 11. With this view a section was taken from the extremity of the thigh-bone of a young elephant, and was calcined for examination in the microscope. The two classes of foramina were found, and were exactly correspondent to those before ascertained in the calf.

Examinations in the Cetacea.

Exam. 12. A section taken from the ossifying margin of the scapula of a piked whale, in a young fish only eighteen feet in length, was calcined and examined with the microscope. The two classes of foramina were seen very distinctly, and bore a close resemblance to those found in the elephant and calf*.

Exam. 13. Was made from a corresponding slip of bone from the ossifying margin of the scapula of a young porpoise. This specimen exhibited the double set of foramina very distinctly; they resembled exactly, in all material respects, the appearances observed in the bones of the animals before mentioned†.

* See Fig. 5. † See Fig. 6.

Examinations in Birds.

Exam. 14. Some thin sections were carefully taken from the lower extremity of the injected femur of a goose, at twenty-one days old. The parts were so divided as to include the cartilage with the newly ossified bone. In dividing these sections it was observed, that they could be cut more readily, and were of a more soft and tough consistence than any bone yet examined. Under the microscope these sections appeared remarkably clean and well defined at the edges of their cavities.

A great number of highly injected membranous sheaths were found in all these sections, occupying the canals, and passing from the cartilage into the newly ossified portion of the bone *.

It was observable, however, that these sections, although they gave less resistance to the knife than other bones, had at the first glance an appearance of greater solidity than any bone formerly examined. But when by exposure to the air, these sections became partially dry, a roughness upon the surface became perceptible, even to the naked eye.

Exam. 15. The injected cartilages and bones

* See Fig. 7.

from a duck at seven days *, and a chick at five days old † were treated as above, and afforded in every respect precisely the same appearances as were noticed in the goose.

Upon consideration, it seemed probable that the superior softness observed, might depend on an excess in the proportion of the animal matter in the bones of growing birds. I was even led to suspect this excess might be so considerable, that the minute structure of the bone would be unable to support itself, if exposed to a strong heat. To determine this point I made the following experiment.

The end of the thigh-bone of a goose was divided, and the surface of the section pared smooth. A part of this surface one-eighth of an inch square was then marked, by cutting away a notch from the surrounding part of the bone. This square piece was magnified to the diameter of two inches by the solar microscope, and the figure accurately traced. The bone was then removed, and calcined till the surface was fair and white. It was then replaced in the microscope, and the shade projected was found to be of the same dimensions in all its parts as the outline taken from the same bone previously to its exposure to heat; having neither gained nor lost in any sensible degree even when thus magnified, by the action of the fire.

* See Fig. 8. † See Fig. 9.

This experiment served to unfold the true nature of the ultimate structure, which in the compound microscope appeared to be a light, even, reticulated texture. The interstices by the aid of a considerable magnifying power, became very large and remarkably distinct. From the appearance it was also evident that the particles of the phosphat of lime were in a state of very loose cohesion *.

Every part of these sections gave precisely the same appearance, whether the surface was natural or artificial; nor were the interstices materially larger or deeper in one situation, than they were in another.

In order to contrast the appearance of the ossifying surface of bone in birds, with that in quadrupeds, the cartilage covering the lower end of the femur of a goose, was carefully separated from the injected surface of the bone. The bone was then placed in the solar microscope, and exhibited a very clear and well defined figure, including a larger and a smaller series of foramina. The larger set contained membranous sheaths brightly coloured with the injected matter, of which the smaller set appeared to have received none, or scarcely any.

The openings of the larger series of tubes were

* See Fig. 11.

observed to be uniformly marked by a slight depression, while those of the smaller series were as constantly distinguished by an elevation above the general surface *.

In the goose three months old, the ossific surface assumes a new appearance. It is now laid out so as to present but a single series of foramina, of equal size and comparatively close arrangement. The sections, at this period, exhibit tubes corresponding to the openings found upon the surface, but the more internal parts of the bone are moulded into a new form, and are cavernous, preparatory to the complete establishment of the general cancellated structure of the bone †.

In the full-grown bird, the ends of the bones display a close and even surface. There are now neither foramina upon the surfaces, nor tubes within, the extremities of the bones being converted throughout into an extremely fine, light, cancellated texture.

§ II. ON THE FORMATION OF THE BONES OF THE HEAD.

Examinations in the Human Fœtus.

Exam. 16. In an embryo at about ten weeks, the teguments covering the head were found to be

* See Fig. 10. † See Fig. 12.

extremely vascular, and of a deep crimson colour. On removing the scalp, a part of the superior margin of the frontal bone, covered by its membrane, was cut out with a pair of scissars, and laid upon glass to dry. On examining it by the solar microscope, many small portions of bone were observed, which had been deposited in points entirely detached from the larger ossific radii. These minute nodules of ossific matter, together with the radiated margin of the bone, were comparatively thick, but towards the central part of the bone, the plate was thinner, and consequently more transparent.

This specimen was examined with attention, first as an opaque, and then as a transparent object, for each of these modes has its advantages. To procure a perfectly exact outline, and to shew the precise figure of all the little ossific radii, it was necessary that a strong light should be transmitted; and on the other hand, to ascertain the superior thickness of the smaller masses of the ossific matter, contrasted with the more evenly disposed structure towards the centre of the bone, as well as to shew the earliest appearance of the phosphat of lime, which is deposited in minute granules dispersed through the intermediate cellular structure of the membranes, required that the surface should have a brilliant light cast upon it obliquely, for when the light was transmitted, the smaller granules were not discernible,

Exam. 17. In the injected embryo, about thirteen weeks old, the membranous coverings of the head were found replete with the finest arterial ramifications, passing in every direction through the open structure of the ossific radii, between the scalp and dura mater. The reticulated texture connecting the membranes to the bone, with the spaces between the ossific fibres, were abundantly stored with a stiff, glairy, colourless, mucilaginous fluid; a secretion perfectly similar in its sensible properties, to that furnished by the membranes lining the canals in the cartilages of the long bones.

Exam. 18. In a fœtus injected, at about seven months, the integuments of the head were found still highly vascular. On making a division down to the bone, a quantity of gelatinous fluid was found deposited between the scalp and the skull. This matter was effused equally over every part of the cranium, separating the integuments to the distance of a quarter of an inch from the surfaces of the bones.

This jelly was transparent, but had a slightly red tinge, and was readily removed from its situation. Laid upon glass, it very soon lost a part of its bulk, by the oozing of a clear limpid fluid. Upon placing this mass under the microscope, it was found to be beautifully and most abundantly vascular. A numerous assemblage of the finest capillary arteries

very variously inflected, was suspended in this bed of transparent matter.

Seeing that this substance lay in immediate contact with the bones of the cranium, and was furnished with a vascular arrangement peculiar to itself, there could no longer be any doubt of its being the loose cellular state of the fœtal pericranium, loaded with a serous exudation from the vessels in consequence of their being injected; although the greatest magnifying power afforded no distinct trace of cellular web or membranous structure.

By way of experiment, a part of this vascular jelly was laid upon a slip of glass, and exposed to a gentle heat: an aqueous vapour soon arose, and continued to pass off, till at length the gelatin assumed the form of a dried membrane. On examination under the microscope it was found, contrary to expectation, that the brilliancy of the injected vessels, which it had been supposed would be obscured, was not diminished by the evaporation of the moisture.

The dura mater was next examined, and as I had just been contemplating the extensive anastomosis, and continual inflexions of the vessels on the outside of the skull, I was forcibly struck with the contrast in the appearance of the arteries des-

tined to circulate the blood on the inside of the same fabric.

The whole series of the smaller ramifications were found to be disposed nearly at right angles to the principal branches of the arteries, resembling so many straight lines crossing the course of the larger blood-vessels.

It was remarkable, that in many points the smaller vessels had yielded more or less to the injection; some were over distended, and others had been ruptured, allowing the injected matter to escape into the cellular texture. This last mentioned appearance was equally obvious upon all parts of the dura-matral surface, and was observed to be equally general, even without the aid of glasses, in a former examination, where this membrane had been injected at an earlier period of its growth.

§ III. CONCLUSIONS.

From the foregoing observations, I think myself warranted in drawing the following conclusions.

1. That in the mammalia, the first rudiments of ossification in the long bones are the effect of a secreting power in the arteries, upon the internal surface of the periosteum, which produce a portion of a hollow cylinder; this form of bone having been found antecedent to the evolution of any cartilaginous structure.

2. That at a certain stage of the process, the mode of operating is changed, in order that it may proceed more expeditiously. A cartilage is formed, which, by the nature of its organization, and by admitting of a specific provision of cavities and canals lined with vascular membranes, which secrete an abundant store of gelatinous matter, is adapted to this particular purpose; while at the same time it serves to determine the future figure of the extremity of the bone, by establishing and conducting the ossification, within its own substance.

3. That from the appearance and texture of cartilage, when examined under the microscope, it may be defined,—an even and finely granulated albuminous matter, deposited in the interstitial spaces of an exceedingly elastic bed of a semi-transparent

reticulated structure, which is apparently a modification of gelatin.

4. That from the period when the ossification proceeds in the mode above described, by the medium of cartilage, the process is continued in the same uniform manner till it has completed the growth of the bone. The growth of the epiphyses, and their union with the ends of the bone, are also effected by the same means.

5. That the ossific matter in the cylindrical bones is deposited primarily in the form of fine thin tubular plates: a mode of deposition of all others the most favourable for their being subsequently remodelled, and for facilitating all the subsequent changes of structure they are destined to undergo.

6. That while the circulation in the capillary arteries situated between the cartilage and bone must provide the phosphat of lime; the principal agent in extending the cylinder, and in effecting the subsequent progressive changes of structure, which in a growing bone are continually taking place, appears to be simply the mechanical pressure exerted by the fluid secretions within the medullary cavities of bone, this power operating successively in different directions, according to the particular determination given by the circulation*.

* This opinion, however extensively it may bear, will not appear strained to those who will for a moment consider the general incompressibility of fluids.

7. That the mode of circulation most favourable for ossific action, is a very slow and uniform motion of the blood through the capillary system; and that the numerous inflexions of the minute arteries in the pericranium, and the great weakness, and rectangular mode of giving off the smaller arteries upon the dura mater, as well as the extremely curious appearance of the blood and injected matter, upon the fine membranous linings of the canals in cartilage, indicating, as I believe, something beyond a mere capillary circulation, are to be considered as so many evident provisions for securing this condition.

8. That in the formation of the cylindrical bones, the ossific surface is arranged into tubular plates of two different sizes, constituting a larger and a smaller series; an arrangement by no means essential to the increase of a bone, because in many of the early stages of ossification, and also where the growth is very slow, the larger series is found to be entirely wanting.

9. That the only apparent use of the larger series of tubes, is that of augmenting the quantity of blood circulated through the ossifying structure, so as to increase the rapidity of growth; for they are abundant in animals of quick growth, less numerous in those that reach maturity slowly, and in the same animal I have observed they are employed by nature, or laid aside, in conformity with the

quick or slow developement of structure, which we know actually takes place at the particular period when the examination is made.

10. That in the growth of the cylindrical bones, and of those flat bones that are formed upon cartilage, the deposit of the ossific secretion is in the first instance made around the external openings of the smaller series of tubes, and upon these only. This opinion derives support from the recent appearances of the bones of quadrupeds, but is most clearly established by the characters found upon the ossific surface in the bones of birds, where the gradations of progressive evolution are more readily traced.

11. That in the flat bones of the skull, the circumstances under which ossification takes place, differ materially from those above described. In these the phosphat of lime in combination with the animal mucilage, is occasionally deposited in small detached unequal masses, without regularity, as if merely laid in the way, preparatory to their subsequent application; that these soon become connected with the more central parts of the bone, and are found to decrease in thickness, as they increase in breadth, until they are finally consolidated with the original plate of bone.

12. That the particular simplicity observable in the mode of production of the bones of the skull,

affords a strong argument in favour of the opinion, that pressure variously modified, constitutes one of the most efficient instruments in the hand of nature: for in this instance, the uniform though gentle pressure, from the impulse of the circulation, and the constantly increasing volume of contents in the head, must be admitted to be the sole agents in completing that process, which in its commencement had the appearance of being conducted in a comparatively imperfect manner.

13. That the ultimate texture of bone is not laminated, but reticulated, the phosphat of lime being deposited as an interstitial substance; for although from the greater compactness necessary to the bones of quadrupeds, the ultimate structure is not in them so readily traced, yet in the more delicately constructed bones of birds, this mode of arrangement is sufficiently obvious, and may at any time be readily ascertained.

This opinion agrees perfectly with that lately given by a most excellent physiologist*. His experiments were made by the removal of the earthy matter of bone, while mine have turned principally upon the destruction of the gelatinous, or animal principle.

I cannot submit the above experiments and observations to the attention of this Society, without

* Anton. Scarpa de penitiori ossium structura.

feeling a desire to excuse their numerous defects. The examinations that I have hitherto made, are extremely few in number, and very imperfect. But when the extent of the subject is considered, together with the great uncertainty of the weather in this country, which renders the application of the solar microscope, even in the summer season, extremely precarious, it will be admitted that many years of persevering labour are yet necessary, in order to complete the circle of this inquiry.

Some of the points connected with the above conclusions, are the result of observations already made by others, but it appeared to me difficult, if not impossible, to pass over in absolute silenc eall those circumstances with which we were before acquainted, and yet explain intelligibly, certain particulars which I believe to be new; for the existence and the organization of the membranous sheaths in cartilage, and their office in furnishing a peculiar secretion, together with the regular arrangement of the foramina upon the ossific surface, and the purposes they are destined to fulfil in the animal economy, are points, which as far as my reading extends, no author has ever mentioned or even glanced at; so that should the evidence of my experiments be deemed sufficiently conclusive, I may perhaps be allowed to consider, that in what regards those particulars, my observations are not altogether devoid of novelty and interest.

Explanation of the Figures.

Fig. 1. The appearance of the bones of the hand of the human embryo, at about eight weeks, dried upon glass, and as projected on a screen by the solar microscope. The set of bones forming the metacarpus, together with those of the first and last phalanges of the fingers are seen very distinctly. The soft parts exhibit an appearance of lines of a brighter colour, and firmer consistence than the gelatin; these appear to be the early rudiments of the tendons of the fingers, although at this period there is no trace of muscular structure.

a. The central parts of the cylinders of the metacarpal bones.

b. The rudiments of the first phalanx of the fingers.

c. The rudiments of the third phalanx.

d. The elevated and brighter coloured lines, representing the rudiments of the tendons.

e. The tendon of the indicator, which I believe was accidentally displaced from its natural situation at

f. in spreading out the object, while in its recent state.

Fig. 2. A section from the upper end of the bone of the arm, with the cartilage, from a human fœtus, at about ten weeks; exhibiting the appearance of the cavities that exist prior to the formation of canals in the cartilage.

This figure was traced while the specimen was recent, but the heat of the solar rays had begun to act before the outline could be finished, producing some contraction in the cartilage, and a partial separation of the ossific surface, from the remaining part of the bone.

a. The section of the cartilage.
b. The appearance of the newly ossified surface.
c. The larger cavities within the cylinder of the bone.
d. The irregularly formed cavities within the cartilage, with their membranes injected.
e. One of these cavities, formed into a regular tube, passing down to the ossifying surface.

Fig. 3. The central part of a section from the lower end of the femur, from a human fœtus in the seventh month, injected. At this period, the membranous canals every where received the injection; and the membranes in the

large canals were injected completely down into the ossifying surface.

The edge of the newly formed bone is seen separated, as in Fig. 2.; and behind this separated margin there is an appearance of an imperfect portion of an osseous tube, in a line continuous from one of the injected cartilaginous canals, into the substance of the bone.

The tubular appearance of the superficial ossific structure is very distinct.

a. The cartilage.
b. The margin of ossification.
c. The parallel tubular arrangement immediately behind the surface of the bone.
d. The larger cavities within the bone.
e.e. The tubes within the substance of the cartilage, with their injected membranes.

Fig. 4. Represents the appearance of the ossific surface after calcination in a specimen taken from a calf. The two sets of foramina may readily be distinguished from each other in this figure.

a.a.a. The larger, or circulating series of foramina.

b.b.b. The smaller, or secreting series of foramina.

Fig. 5. Exhibits the appearance of a section including one of the large canals, in the ossifying margin of the scapula of a piked whale. The internal communications of this canal must have been very extensive. The primary tubular arrangement, and the progressive change in structure from thence into larger spaces and thicker masses, may be readily traced upon this figure.

a. The tubular arrangement of the newly formed bone, the openings of which upon the ossific surface form the smaller series of foramina.

b. The section of a canal belonging to the larger series of foramina.

Fig. 6. Represents a section, similar to the above, from the scapula of a young porpoise. The appearances are very exactly the same as those above noticed.

a. The tubular arrangement.

b. The section of one of the larger series of foramina.

Fig. 7. A part of a section of injected cartilage from the femur of a goose, three weeks

old. The membranes have the same striking peculiarity in their appearance as the corresponding membranes in other animals; for, however great the magnifying power applied, no trace of distinct vessels could be distinguished in any of them.

The sections of the medullary tubes within the bone, shew the membranous lining was highly injected.

a. The cartilage, with the canals, and injected membranes, seen passing down into the bone.
b. The substance of the bone.

Fig. 8. A section of cartilage and bone, from the femur of a duck at seven days old, injected. The membranes lining the canals in the cartilage had not received the injection; those, however, within the cavities of the bone were very well injected.

a. The cartilage.
b. The canals within the cartilage, seen passing down into the bone.
c.c. The bone with its canals, the membranes of which had received the injection.

Fig. 9. A section from the head of the humerus of

a chick, five days old. It shews the tubes within the ossific structure. The corresponding thin section of cartilage exhibited canals answering to each of those entering the bone, but this appearance soon vanished by the drying and shrinking of the cartilage.

a.a. The openings of the canals upon the surface of ossification.

Fig. 10. The injected ossifying surface of bone, from a goose, at three weeks old. This view includes a portion, the extreme length of which was one-eighth of an inch. The larger set of openings are marked by a depression upon the surface, and an injected membrane which in drying has in most of the canals suffered some degree of collapse, exposing more or less of the true circumference of the tube.

The smaller set of foramina may be distinguished by a flattened elevation, which forms a circular border round each of these openings. As to arrangement, these foramina have much less regularity, than is observed upon the bones of quadrupeds.

a.a.a. The openings of the larger or circulating series of foramina.

b.b.b. The openings of the smaller or secreting series of foramina.

Fig. 11. The same surface, exhibited in the last figure, as it appears subsequent to calcination. This view displays the reticulated structure so clearly as scarcely to require an explanation. The image was faint, from its being magnified to an extreme degree, but the character was nevertheless perfectly distinct and satisfactory.

a.a. The elevated openings from the smaller foramina.

b.b. The depressed openings from the larger series.

Fig. 12. Represents the ossific structure in a goose, at three months old. The section is exhibited in its calcined state. This figure demonstrates the progressive change that takes place in the structure of the bone, the more internal parts of which have already assumed the form of large cavernous cells.

a. The surface of ossification.

b. The remaining part of that structure which exists during growth.

c. The appearance of the ultimate or cavernous structure, which extends itself from the centre towards the extremity of the bone.

OBSERVATIONS

ON THE

MEDITERRANEAN FEVER,

By ALEXANDER DENMARK, M.D.

LATE PHYSICIAN TO HIS MAJESTY'S FLEET IN THE MEDITERRANEAN, AND NOW RESIDENT PHYSICIAN AT PORTSMOUTH.

COMMUNICATED BY

DR. STANGER.

Read March 28, 1815.

THE late successive and devastating attacks of fever on the shores of the Mediterranean have already employed the pens of many physicians in both the army and navy, whose abilities command the greatest respect for all their productions. We have, however, still to lament the existence of discordancy among these gentlemen, both as to the occasional cause of the disease, and the most eligible means to be adopted for its cure. With regard to the latter, as far as I am enabled to affirm from my own opportunities of observation, corroborated by the still more extensive experience of others, I have but little hesitation in inculcating the unequivocal superiority of *depletion*.

My public duties upon former occasions, as well as upon that which gave birth to the present communication, afforded me many opportunities of witnessing the Mediterranean Fever. They have served to remove scepticism. They have shaken the prejudices of education, and have taught me if not to disdain, at least, on some occasions, to disregard the doctrines of the schools.

It does not much matter whether we look upon fever as an idiopathic, or symptomatic disease; whether we regard it as occasioning topical congestions and inflammations, or these as giving rise to fever. Our opinions on these points may indeed derange our nosology, but, fortunately for our patient, they cannot materially affect our practice. They may tend to throw us off our guard with respect to infection; but the grand outline of our treatment must remain the same. Neither shall we insist upon giving exclusive credit to the brain, the liver, the stomach, or any other viscus, either for bearing the brunt in all the patient's sufferings, or for disseminating so much mischief to the machine at large. For I believe the fact to be undeniable, that all these viscera have been found, at different times, to be individually, and sometimes collectively affected, in the very same fever.

The names of Boyle and Irvine, I believe, stand foremost in establishing the decisive superiority of the treatment of the Mediterranean Fever, by de-

pletion. They have since had many successful followers; and Dr. Irvine's little work has made numerous proselytes. My principal object in this paper is to shew that we may even go further than these gentlemen do, in inculcating their practice. At the same time I shall add some cursory observations of my own, dictated by actual occurrences, as they passed under my daily review, in my professional visitation of the sick at the Naval Hospital at Minorca, during the last three months of the existence of that establishment. This period is mentioned in consequence of the unparalleled influx of fever patients during that time, especially from among the English prisoners then returned from captivity at Marseilles. A detail of cases would not be interesting, even if room could be spared in the valuable pages of this Society, for their publication. I shall therefore give a general statement of the numbers which were under my care, in the form of a Table.

An ACCOUNT *of* PATIENTS *admitted into the* NAVAL HOSPITAL *at* PORT MAHON, *between the 1st of April and the 8th of July*, 1814.

Classes of People received.	Remaining in the Hospital with various Complaints on the 31st of March.	Received between 1st of April and 8th of July.			How disposed of.						
					Fever.		Other Complaints.				
		Fever.	Other Complaints.	Total received within the above period.	Cured.	Dead.	Cured.	Dead.	Invalided.	Total discharged within the above period.	Convalescents remaining to be discharged into the Hospital Ship, July 8th, on breaking up the Hospital.
Seamen and Marines belonging to the Fleet.	108										
Released English Prisoners from France.		243		243	233	10				243	
Seamen and Marines from the Fleet.		281	73	354	254	19	4	8	61	346	8
Total	108	524	73	597	487	29	4	8	61	589	8 Making altogether 597, the number admitted.

The 108 found in the hospital on the 1st of April, consisted chiefly of pulmonary consumptions, wounds, and worn out seamen. Of the 524 fevers received during the three succeeding months, 29 died, which was about one in eighteen. The fever patients received from the fleet were almost exclusively from the ships employed in transporting the released English prisoners; with the exception of one frigate whose men were visited with fever after being at Leghorn and Palermo, and who were doubtless exposed to the usual predisposing and exciting causes.

The history of the released English prisoners mentioned in the foregoing Table, may be thought somewhat interesting. Many of them had been in France from the beginning of the war. Some in their eagerness to revisit their native country, contrived to get released from hospitals, with disease actually upon them; and others, before their strength was sufficiently recruited. But the majority had sustained great previous hardships, in being marched out of the way of the Allies in their rapid movements through France: sometimes 40 miles a day, badly fed, badly clothed, and often badly lodged. On the suspension of hostilities, they were sent to Marseilles (being the nearest port), to embark for England. They amounted to about a thousand, or eleven hundred in all; and had three ships of the line appointed for the purpose of transporting them to Minorca. The two

first of these ships that arrived, were not detained long at Marseilles, after embarking their proportion. The third was detained between two and three weeks receiving the stragglers, men, women, and children: many of them recently out of hospitals, weak, and emaciated. And so averse were they to complaining, even after they reached Mahon, (lest they should suffer, as they feared, a longer absence from their homes and families, by being sent to the hospital) that we were under the necessity of instituting a daily examination of them.

The documents before us are too limited to decide the question as to the contagious nature of the disease. They must, at least, however, be allowed to contribute essentially to establishing the contagious nature of the fever among the prisoners, which bore a close analogy in its character, symptoms and progress, to the common endemic of the Mediterranean.

Mr. Boyd, surgeon of the hospital, was seized with fever very early, and with difficulty escaped. The suspension of this gentleman's services was considered as a serious loss. He ascribed the attack to his having afforded his personal assistance towards the accommodation of a female who was delirious*. About this time the two hospital mates

* This wretched woman afterwards leaped from a window and fractured her spine. Her husband and two children (being all the family) were affected with fever at the same time: and one only, (the oldest child) escaped death.

were also taken ill; they had protracted convalescence, having suffered two relapses; but they ultimately recovered. All these gentlemen had, early in the disease, great determination to the head, with retrograde action of the stomach. One of the mates had bilious vomiting with yellow suffusion, and exquisite pain in the epigastric region. They all kept perfect possession of their mental faculties through the whole course of the disease. One nurse only (a Mahonese) was seized with fever. She was between fifty and sixty years of age; and was removed, at the request of her friends, from the hospital to Mahon, where she died.

The surgeon of the hospital and myself were among the number who reckoned upon the non-contagious nature of the fever. These occurrences, however, served to stagger our belief; and a combination of subsequent events has conspired to make me a convert to the opposite side of the question.

Hospital mates were now procured from the ships in the harbour, and our daily receipts were so numerous that our little hospital soon became filled to the extent of its establishment. We were, therefore, obliged to prepare apartments hitherto unoccupied; and Admiral Hallowell, then the senior officer of the port, with his wonted zeal and humanity, very soon afforded us the requisites for their equipment.

The three ships, already mentioned as being em-

ployed on the service of transporting the released prisoners from Marseilles to Minorca, were, at the time, or soon afterwards, affected with fever; but particularly the last, which, as I have already observed, was so much longer detained after she began to embark them. Her only assistant surgeon was taken ill, and sent to the hospital; and the gentleman appointed to succeed him very soon afterwards caught the fever, and was sent there likewise. From this ship alone we received sixty-seven men, seamen and marines. And it must be observed, that the respective crews of these ships, were not exposed to any of the more common remote causes, to which sailors are so liable, viz. fatigue, intemperance, exposure to intense solar heat, succeeded by cold, &c. &c.

Those of the ship's companies seldom failed to complain on the occurrence of the first symptom of indisposition; and, as I had requested that they might be sent on shore, as soon after their becoming ill as possible, they were received at the hospital, in many instances before the termination of the chilliness and shivering which ushered in the fever. In these instances, venæsection was never had recourse to, till the vascular system had fairly emerged from the depressed state incident to that stage of the fever, and reaction had clearly manifested itself by the returning glow of the skin, the filling of the previously shrunk and dejected features, and the firm though frequently oppressed

beat of the pulse. Former experience not only taught me, that an earlier abstraction of blood was never borne to an extent productive of ultimate benefit; but on the contrary, seemed to be injurious, by tending to protract the first stage of the paroxysm. I am afraid that due regard has not been paid to this circumstance; and that, in the recent rage for phlebotomy, it has been too much overlooked. I am, indeed, induced to ascribe to this oversight, consequences replete with still more serious evils; for where persons have witnessed the loss of a few ounces of blood to be borne so badly, they have sometimes inferred, without looking to the real cause, that the disease was one of *debility*. The treatment was, of course, adapted to the diagnosis.

It remains to say something as to the manner of abstracting blood. The advantages of taking it from the temporal artery, have been emphatically dwelt upon; and in conformity with custom, and in obedience to the dictates of high authority, I have generally ordered it from the temporal artery, but without any conviction of the superiority of the practice. Indeed, neither physiological reasoning, nor anatomical induction can, to my mind, contribute to give this method any superiority; unless it should be said, that the advantage consists in drawing the blood immediately from an artery. The abstraction of blood from the general mass, whatever be the vessel from which it is taken,

amounts, I conceive, in the end, to the same thing, provided it be taken in the same quantity, and in the same time: unless, as I have just observed, experience should establish the superior advantage of taking it from the arterial circulation, in preference to the venous, which I am neither prepared to support, nor contradict.

A case of this fever will seldom, I believe, be met with, wherein the use of the lancet, to a greater or less extent, will not be applicable. But I am compelled to acknowledge that this powerful remedy is not to be considered in all cases infallible; and that it may sometimes be followed by decided disadvantage. This is no problematical doctrine; and the practitioner who has yet to learn its truth from practical demonstration, may have to regret his temerity. This circumstance, however, can by no means shake the general rule, supported as it is, by the best criterion of its utility,—unparalleled success. The danger consists in either applying the remedy too late, or too often; and it has fallen to my lot, to see, under my own direction, the abstraction of blood accelerate the patient's death; and this too, under circumstances that would seem to have fully justified its employment. After the supervention of the yellow suffusion, whatever may be the other symptoms demanding it, venæsection, I believe, will not be borne with impunity.

I shall now say a few words on the use of mer-

cury, our "sheet-anchor," in affections where the biliary organs are implicated. The medical world is already in possession of so much information upon this subject, that I can scarcely hope to add to it. Viewed in any way, the utility of mercury is incontrovertible. Calomel is the preparation usually had recourse to; and it is undoubtedly beneficial in whatever way it operates. Whether the practitioner be disappointed in its mode of operation or not,—whether it produce catharsis, when exhibited with a view to salivate, or salivate, when intended to act as a cathartic, the result in either case will be beneficial, though, perhaps, not to the same extent. I have prescribed it in various forms, in order to fulfil both these intentions, and the result has enabled me to speak of it most favourably.

During the summer of 1810, I was invested by the commander-in-chief with the medical superintendance of the Mediterranean fleet. Some of the ships were then visited, to an alarming extent, with the endemic of that climate. The fever was exclusively confined to those ships, whose men were exposed to the laborious duties of watering and refitting in harbour, which duties were commenced early in the morning, and continued through a long day, with little intermission, under an intense degree of heat, greatly increased in intensity by being reflected from an arid rocky soil. In addition to this, was to be reckoned the frequent abuse of

spirituous and vinous liquors, and not unfrequently the unguarded exposure of their persons to the chilling colds and dews of the night; while the ships at sea remained perfectly healthy *.

At that time I frequently recommended calomel in three grain doses, with as much pulv. antimon. every three or four hours. The antimony seemed to assist the purgative operation of the calomel; for this combination seldom failed to procure copious bilious stools, and to produce relief. I do not recollect any instance of the antimony, given in this way, creating nausea. On the contrary, it cleansed the intestinal canal, by increasing its peristaltic motion; and by emulging the biliary ducts, invariably relieved that symptom when present. In the treatment of the fever, however, of which this communication attempts the history, I usually gave the calomel in scruple doses twice a day, in many cases from the first invasion of the complaint, with the intention of attacking the disease speedily, through the system. But in this, I commonly failed during the first days, in plethoric habits. At this early stage, its only visible effect was to keep the bowels clear. Before the system was lowered, I could not observe that it evinced any effect through the medium of the circulation. Yet I can scarcely believe that the great quantity of mercury in many cases exhibited, could have been

* Vide Mr. Johnson's inestimable work "on the Influence of Tropical Climates upon European Constitutions."

all carried off by stool. Hence I conceive that the febrile action was too high to be overcome by the mineral, even supposing it to be absorbed. But after the lapse of two or three days, and the use of free venæsection and purging; and at an earlier period in debilitated subjects, and in cases of relapse, the mouth often became suddenly sore with profuse ptyalism, and rapid convalescence as certainly ensued, the ptyalism remaining as the only source of uneasiness to the patient. I do not recollect any deaths after the specific action of the mercury shewed itself; nor did the yellow suffusion occur after this symptom appeared. As to relapses after its use, my notes do not serve me with information upon that subject.

Purgatives are essential to the cure: and, as I observed, calomel with me ranked foremost; but the neutral salts were also in common use; and when there happened to be irritability of stomach with abdominal pain, the ol. ricini with mint water, or followed by an effervescing draught, answered well. To these were conjoined glysters.

The *cold affusion* or ablution, under the restrictions of the late Dr. Currie, often produced the happiest effects, as in the latter stages did the tepid or warm bath.

Blisters, in local affections, particularly of the head, were had recourse to, with the advantages

usually resulting from their application in such cases.

Antimony. It behoves me to speak with caution in recommending antimony, since the use of it has been almost proscribed by so many eminent authorities. I have, however, given with advantage, the pulv. antimonialis in three grain doses combined, as above related, with calomel; and certainly without producing the nauseating effects ascribed to that medicine. I have not been much in the habit of employing antimony as an emetic, having placed more reliance in the use of purgatives. But in the cases of the bilious remittent fever, wherein emetics were had recourse to, (which was always at the commencement of the disease), the pulv. ipecacuanhæ was given in conjunction with the tartarised antimony, and without occasioning any of the ill consequences which I have heard enumerated.

From the inadmissibility of emetics in the West India Fever, their use seems to have been interdicted here; but where spontaneous vomiting has early occurred, with the ejection of bile, and crude contents of the stomach, the patient invariably experienced a temporary alleviation. This circumstance emboldened me, on some occasions, to imitate the natural operation at that period of the disease, when the nausea and irritability of the stomach appeared to be in a great measure occasioned by its contents. At a later period, when what has

been termed the "gastric symptoms" supervene, I think a man must be possessed of either great hardihood, or great ignorance, to add to inverted action of the stomach, (whether we consider its source as inherent in the viscus itself, or derived, by sympathy, from the general systematic derangement) by the administration of emetics. This discrimination is, I am persuaded, deserving of attention, and may find its use in practice.

Vomiting, as a symptom, takes place at various periods of the disease; but I have not observed it in the Mediterranean earlier than the third day, excepting as a symptom coeval with the first attack. The matter ejected from the stomach was more commonly clear, or tinged with bile, than grumous. It was sometimes slimy or ropy, mixed with whatever had been recently swallowed. It a good deal resembled what we see in pyrosis: and this symptom, when it occurred at an advanced period of the disease, was connected with a train of others, which, in my opinion, rendered it strikingly characteristic. Every part of the surface was then *colder* than natural, with a cold dampness of the face, neck, and trunk; pulse feeble, frequent, and indistinct; features shrunk, with a languid look of the eye, dimness of sight, and dilated pupil; lips purplish; tone of voice slow and plaintive; deep sighing; the intellect appearing feeble, but collected; and the tongue with a white, clammy, sodden appearance, as if parboiled. In this unhappy and but

too often irremediable state, the patient continued for some time (the powers of life gradually receding) till death closed the scene. All our efforts to rouse him from it, were frequently ineffectual. Opium, ammonia, aromatics, brandy, æther, effervescing draughts, wine, spices, all failed! Opium plasters, and blisters to the præcordia, were occasionally attended with better effects. But of all remedies, the warm bath seemed to be most useful. It communicated, through the medium of the surface, energy to the sensorium, and thence to the vascular system; and by sympathy to the stomach. It enabled this viscus to retain small quantities of liquid nutriment, combined with light cordials; which, in some cases, were given while the patient lay in the bath. The debility of the stomach seemed conspicuously to sympathize with the torpid skin. The stimulus of heat to the latter, caused an almost instantaneous cessation of irritability in the former.

Mr. Boyd, the surgeon of the hospital, was one of those who experienced the transition here related, from a high state of reaction, to that of extreme lowness, approaching to death. He had suffered copious evacuations, and observed a rigid course of abstinence for ten or twelve days, even wishing the depletory plan to be carried further; and refrained from the necessary indulgence of the appetite, after a remission had obviously taken place, from an apprehension of the recurrence of fever. I was called to him in the middle of the

night, and found him scarcely able to articulate, vomiting a turbid or whey coloured fluid, with excessive anxiety, sobbing, and a pulse extremely weak; cold clammy skin, and the features pale and shrunk. Cordials were immediately administered with the best effect, succeeded by light nutriment; and he finally recovered, but after a tedious convalescence.

This is a truly critical period, and requires the greatest vigilance and promptitude. For if it is not attended to early, the stomach afterwards rejects every thing swallowed. The symptoms are well marked, and ought to be duly appreciated. The languor, sinking, and anxiety, prostration of strength, and diminution or exhaustion of the vital energy, are here strikingly pourtrayed. I have observed this state to follow evacuations, especially by the lancet, when made too late; and it seemed to me rather to originate from this cause, than to be the result of exhaustion from the reaction of disease.

Delirium, I have not observed to be by any means a common symptom, even in the lowest and last stage of the disease.

At the commencement of convalescence, the greatest caution and care were required to prevent excesses. Intemperate indulgence of the appetite was a common cause of relapse. I found the recovery to be more rapid and permanent under half

allowance of diet, and a very small proportion of wine. Bark and tonics were perfectly unnecessary, except in some few instances, where the digestive powers were much depressed, when quassia or calumba were exhibited with advantage for a few days. Drowsiness, for one, two, or three days, I noticed in some, as a curious precursor of convalescence. The patient in those cases expressed no want, and when roused for the purpose of administering food and medicine, he answered coherently, but with a degree of stupor, which evinced torpor of the sensorium and nervous system, similar to what we see in people exhausted from fatigue. From this state he would emerge after an indefinite period, refreshed and free from any complaint but debility: the appetite would return, and convalescence ensue.

Relapses were frequent, and often required the use of the lancet more than once; but in many instances, a brisk cathartic or two answered the purpose of removing the symptoms. In some I traced a proneness to constipation to be the cause of relapse; in which cases, small doses of calomel and compound extract of colocynth, had the best effect in guarding against this tendency.

In cases where the sufferings of the patient terminated in death, after the occurrence of the yellow suffusion, in addition to the more common symptoms leading to that event, the lungs were inflated with unusual difficulty, and in one half the time

occupied for expiration, accompanied with loud moaning, expressive of indescribable pain and anxiety. The abdomen was usually somewhat tumefied, and an aggravation of pain was evinced, especially upon pressure of the præcordia and hypochondria. The pulse became more rapid, and without strength; the stools were passed involuntarily, and death soon ensued.

Dissection. I regret my not being able to speak with minuteness upon this important subject. My dissections were not sufficiently numerous, and were confined chiefly to the inspection of the abdominal viscera. To this I was more particularly directed, by appearances antecedent to death. The few subjects I examined had the icteric suffusion, with the anxiety, pain, and abdominal tumefaction, already described. The gall-bladder, stomach, and duodenum contained but little bile. The liver, in one case only out of three, was enlarged. In the others it was diminished in size; but of a texture preternaturally firm, so as to oppose considerably more than usual resistance to the knife, and cut somewhat granular; which altogether indicated an impeded, if not obstructed circulation in the ramifications of the vena portæ; and consequently defective biliary secretion. In these last cases there was also an alteration in its colour, which approached to a light brown.

I am aware that my inquiries, in this extensive field, have been by far too confined to merit much

public attention. I shall not, therefore, presume to obtrude an opinion, either upon the cause of symptoms, or of morbid læsions, unsupported by the evidence of anatomical demonstration. But without descending to minutiæ, if I may be allowed the common privilege of medical writers,—to theorize a little,—I would indulge my fancy. I shall make but a very few remarks on the nature, and causes of the fever in question.

Its invading symptoms do not, in any essential manner, differ from those of fever in our own country. There is an obvious dissimilarity, however, as the disease advances, and this dissimilarity seems to increase in a ratio proportionate to the protraction of the disease.

Without attending to minute nosological distinction, I would say, that the Mediterranean Fever bears the same proportion or affinity to the synochus of England, which the Intertropical Fevers do to that of the Mediterranean; or, in other words, that they are all only degrees or modifications of the same disease, and that these modifications are chiefly subservient to, and dependent upon, diversity of climate. The Yellow Fever, for instance, of the West Indies, after the invading paroxysm, pourtrays a train of symptoms, characteristic of an intensity of degree, far exceeding those of either the Mediterranean or of the northern climates. Its inflammatory symptoms, if not subdued very early,

soon exhaust the powers of life, and rapidly run its victim into destruction. The bilious remittent, as it is termed, of the Mediterranean, viewed as the same disease in a milder form, displays a set of symptoms less aggravated in degree, and agreeably to the undeviating laws of nature, running a more protracted course: the exhaustion and visceral disorganization being in a ratio to the intensity of morbid action. Hence in *this*, depletion is admissible at a later period than in the *former*. The third and mildest form of fever, is that witnessed in northern climates, where the symptoms are more uniform in their progress, and less rapid in their course.

It will be remarked, that I allude to idiopathic fever alone, whether occasioned by contagion or miasmata, or without either. For I cannot allow, that in any of the fevers now under consideration, although the brain, stomach, intestines, liver, or all the viscera in the body be found deranged in structure, these derangements had any thing to do with the production of the fever. These morbid changes are consequent on the fever, and they are moderated or prevented, by subduing the violence of the reaction. This last, we must however also admit, is kept up by the local irritation of the viscus affected, when that is once established.

I cannot explain *why* what are usually called the two great remote causes of fever, viz. marsh miasma

and contagion, should produce a disease identically the same*; or why a fever in every respect similar, should be produced without the intervention of either. We know this last to be the case. It comes daily under our observation in the navy; and I may aver, without much fear of contradiction, because it is notorious to every surgeon who has served in the Mediterranean fleet, that the bilious remittent is much more frequently contracted from the more palpable sources of fatigue, intemperance (especially in drinking), and vicissitudes of heat and cold, than from either miasma or contagion.

* Marsh miasma, especially when in a very concentrated state, is said to occasion continued as well as intermittent fevers.

FURTHER OBSERVATIONS

ON THE

ULCERATION

OF THE

CARTILAGES OF JOINTS.

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Read May 9, 1815.

I.

IN my former communications to this Society, I have observed that ulceration of the articular cartilages takes place in the advanced stage of any of those diseases to which the joints are liable, in consequence of the morbid action extending to them from the contiguous parts; and, that it also exists in many instances as a primary affection, in the early stage of which the bones, synovial membranes, and ligaments are in a natural state, but which, if neglected, ultimately occasions the entire destruction of the articulation. In the present paper I propose to offer some remarks on the

symptoms which occur in cases of this last description, and on the surgical treatment which has appeared to me to be most calculated to afford relief to the malady. It is not, however, my intention to exhaust the patience of the Society by a systematic treatise on these subjects, but to confine myself to the consideration of certain practical points to which my attention has been called by the circumstances which have occurred in my own experience.

The ulceration of the articular cartilages takes place at any period of life, but principally in children or in adults under the middle age. Of sixty-eight persons affected with this disease, fifty-six were under thirty years of age: the youngest was an infant of about twelve months; the oldest was a woman of sixty. As the knee is more frequently affected by inflammation of the synovial membrane, so is the hip more liable than other joints to the ulceration of the cartilaginous surfaces. In general the disease is confined to a single joint, but it is not very unusual to find two or three joints affected in the same individual, either at the same time or in succession. Sometimes the patient traces the beginning of his symptoms to a local injury, or to his having been exposed to cold: but for the most part no cause can be assigned for the complaint, and often the cause, to which the patient attributes it, appears to be rather imaginary than real.

Where the hip is affected, the only symptoms met with for some time, are pain and a slight degree of lameness in the lower limb. The pain at first is trifling and only occasional, afterwards becoming severe and constant. It resembles the pain of rheumatism, from which it is difficult, and sometimes impossible to distinguish it; since it often has no certain seat, but is referred to different parts of the limb in different individuals, and even in the same individual at different times. For example, a gentleman labouring under this disease in the hip, complained during a whole year of slight wandering pains from the loins to the foot; at the end of this time, there was a violent pain referred to the hip, knee, and outside of the leg, as low as the ankle. A man in St. George's Hospital, had pain in the hip for three months; then pain took place in the knee, that in the hip being still unabated. A third patient laboured under pain in the hip, and at the end of four months, pain took place in the knee likewise. In a fourth, there was, at first, pain in the ankle only; then in the knee and thigh, and lastly in the hip. As the disease advances, the pain becomes exceedingly severe, particularly at night, when the patient is continually roused from his sleep by painful startings of the limb. Sometimes he experiences a relief from pain in a particular position of the joint, and in no other. A patient in St. George's Hospital for some weeks, never obtained any rest, except when he had placed himself on the edge of

his bedstead, with his feet on the ground, and resting his body on the pillow, in a position between that of lying and sitting. As the pain increases in intensity, it is more confined in its situation. In the greater number of instances it is referred both to the hip and knee; sometimes that in the hip, but more frequently, that n the knee being the most severe. At other times there is pain in the knee, and none in the hip. A boy in St. George's Hospital complained of pain only in the inside of the thigh, near the middle: and another patient, a little girl, referred the pain to the sole of the foot. Wherever the pain is situated, it is aggravated by motion of the hip. There is tenderness of this joint when pressure is made on it, either before or behind; and as the disease advances, there is usually a slight degree of tumefaction of the groin. In this there is nothing remarkable, since we must suppose, that a disease going on within the articulation must ultimately occasion some degree of inflammation of the neighbouring soft parts; but it is a curious circumstance, that in some cases there is tenderness of those parts, to which, though not diseased themselves, the pain is referred from sympathy with the disease in the hip. I have observed this in the knee many times; and a gentleman in whom the pain was referred to the outside of the leg, had great tenderness every where in the course of the peronæal nerve. I have also (though not often) seen a slight degree of puffy swelling of the knee, where pain was

referred to it in consequence of disease in the hip. These facts correspond to what may be observed in other cases, where pain is referred to a sound part, from a sympathy existing between it and some other part that labours under disease: for example, the passage of a calculus down the ureter occasions not only pain, but tenderness, swelling, and no rifling inflammation of the testicle.

When the disease has existed for some time, and the pains have become violent, so as to interfere with the exercise of the joint, the nates on the affected side undergo a remarkable alteration in their form. They become wasted and less prominent, so that instead of the usual convexity, they present the appearance of a flattened surface: at the same time they are soft and flaccid to the touch, and hang more loosely towards the lower edge. I have, in a former communication, explained that this change in the figure of the nates arises from the wasting of the glutæi muscles; and that, although, in combination with others, it is an important symptom to be attended to, it is not in itself to be regarded as a certain diagnostic mark of disease in the hip; since in its early stage this symptom is wanting; and it is met with in other diseases, in which the muscles in the neighbourhood of the hip are for a long time not called into action, although the joint itself is unaffected.

Another symptom, which occurs in this disease,

is an alteration in the length of the limb. 1. In the most advanced stage, when the head of the femur and the bony margin of the acetabulum have been extensively destroyed, there is nothing to prevent the action of the glutæi muscles from drawing the head of the femur upwards, and in consequence the limb is shortened, as where the neck of the femur has been fractured. 2. In some cases the joint being filled with coagulable lymph, while there is no considerable destruction of the bones, the head of the femur is pushed outwards, till it is beyond the margin of the acetabulum, when the muscles pull it upwards, and occasion a dislocation upwards and outwards. The limb is here shortened, the thigh is bent forwards, and the toes are turned inwards, as where the dislocation in the same direction takes place from any other cause. I have mentioned, in a former paper, some instances of this kind of dislocation, where there was an opportunity of examining the parts after death *. The shortening of the limb, which occurs from either of these causes in the advanced stage of the disease, is always a serious symptom, as it is in general either attended with, or followed by, the formation of an abscess in the articular cavity.

3. In the earlier stage of the disease the patient often complains that the limb of the affected side is longer than the other. This can not be ex-

* See Medico-Chirurgical Transactions, Vol. iv. pp. 240, 249.

plained on the supposition of the acetabulum being filled with matter or solid substance, since this would cause the head of the femur to be pushed outwards rather than downwards. The fact is that there is only an apparent, and no real elongation of the limb. If the patient be placed on his back in a horizontal position, both thighs making the same angle with the pelvis, the foot on the diseased side may at first appear to be as much as two or three inches lower than the opposite foot; but if the distance be accurately measured from the anterior superior spinous process of the ilium to the patella, no difference is perceptible. The apparent elongation is produced by the position of the pelvis being altered, so that it no longer makes a right angle with the spine, and the crista of the ilium is visibly depressed below that of the opposite side *.

4. In other cases from a similar cause, there is an apparent shortening of the limb, the pelvis being inclined in the opposite direction. Two children were admitted into St. George's Hospital at the same time, and in the same stage of this disease in the hip. In other respects their symptoms were precisely similar, but in one of them there was an apparent shortening, and in the other an apparent elongation of the affected limb. It is of great im-

* This fact (respecting the elongation of the limb,) I noticed several years ago, and I have since found that the late Mr. Crowther had made the same observation before the period at which I made it myself. See "Crowther on White Swelling," 2d edition.

portance with respect to the prognosis, to distinguish the apparent shortening of the limb in the early stage, from the real shortening which takes place in the advanced stage of the disease, since the latter is a very serious symptom, indicating the formation of an abscess with all its train of bad consequences; and the former furnishes no ground of alarm respecting the ultimate termination of the case.

The health of the patient usually suffers, even before abscesses have formed, from the want of exercise, pain, and particularly from the continued disturbance of his natural rest. I recollect no instance of an adult in whom abscesses had formed, and who did not ultimately sink exhausted by the hectic symptoms which these have induced. Children may recover in this ultimate stage of the disease, but seldom without a complete anchylosis of the joint. If suppuration has not taken place, I believe it rarely happens that the limb after the cure does not regain its natural degree of mobility*.

* However difficult the diagnosis of this disease of the hip may be in its early stage, it may be made with sufficient certainty when the disease is somewhat advanced. It is to be founded however not on a single symptom, but on the combination of symptoms, and on the history of their progress, so that no degree of experience can enable a surgeon to form his judgment correctly without a careful investigation of the circumstances of the case before him. The morbid affections most liable to be confounded

Where the cartilages of the knee are ulcerated, the pain is confined to the affected joint: at first it is slight and only occasional, and in the early stage of the disease it is completely relieved by remaining in a state of rest for a few days, but it returns as soon as he resumes the exercise of the limb. By degrees the pain becomes constant and

confounded with the ulceration of the cartilages of the hip are the following:

1. Inflammation of the synovial membrane of the hip, of which I have spoken in my former papers.

2. Chronic inflammation of the soft parts in the neighbourhood of the hip, terminating in the formation of a chronic abscess. Here there is pain, but more confined in its situation, than where the cartilages of the hip are ulcerated: the pain is less severe; less aggravated by the motion of the joint; not relieved in the same degree by rest; not attended by a flattening, and very soon followed by a tumefaction, of the nates.

3. The scrophulous disease which I have described in the Fourth Volume of the Medico-Chirurgical Transactions, beginning in the cancellous structure of the bones and afterwards occasioning ulceration of the cartilages, may affect the hip as well as the other joints. On this subject I hope to be able to offer some remarks in a future communication.

4. I have seen several cases, in which I suspected the symptoms to depend on a morbid affection of the sciatic nerve: and in which they bore a certain analogy to those of the disease in question. There was pain referred to the parts, to which the sciatic nerve is distributed; but not very severe nor materially aggravated in consequence of the disease being neglected. There was tenderness in the situation of the nerve on the posterior part of the hip and thigh: the tenderness being sometimes more considerable in one part than in another. The symptoms were relieved principally by the application of blisters over the trunk of the nerve, which was suspected to be the seat of the malady.

very severe, particularly at night, when it disturbs the patient by continually rousing him from his sleep. The pain is referred principally to the inside of the head of the tibia; is aggravated by motion, so that the patient keeps the limb in one position; but is unattended by any actual rigidity or stiffness of the joint, except in an advanced stage of the disease.

The ulceration of the cartilages of the knee differs with respect to its symptoms from inflammation of the synovial membrane in this, that the pain in the former is slight in the beginning, and gradually becomes very intense, which is the reverse of what happens in the latter. But there is another circumstance which forms a remarkable distinction, between the ulceration of the cartilages, and most other diseases, to which this joint is liable. The pain in the first instance is unattended by any evident swelling, which comes on never in less than four or five weeks, and often not till several months have elapsed from the commencement of the disease. The reason of this is too evident to require explanation, and it is equally unnecessary to point out the importance of it, as affording the means of making a more ready diagnosis. We must not indeed conclude indiscriminately, wherever there is a slight pain in the knee unattended by swelling, that the cartilages are in a state of ulceration, since it is evident that this symptom may equally arise from inflammation of the bones themselves, of the liga-

ments, of the fatty substance of the joint, or from simple nervous affection; and instances will occur to every surgeon, where there is reason to believe that the above-mentioned symptom arises from one or other of these causes. But when the pain continues to increase, and at last is very severe; when it is aggravated by the motion of the bones on each other, and when after a time a slight tumefaction of the joint takes place, such as I shall presently describe, we may conclude that the disease consists in an ulceration of the cartilaginous surfaces; and in all such cases, which have come under my observation, their subsequent progress, and the morbid appearances presented by dissection, when an opportunity has occurred of observing them, have fully confirmed this conclusion.

The swelling, which attends this disease in the knee, differs from that, which occurs in either of those of the synovial membrane, which I have formerly described. It arises from a slight degree of inflammation having taken place in the cellular membrane external to the joint, in consequence of the disease within it. The swelling is usually trifling, appearing greater than it really is in consequence of the wasting of the muscles of the limb. It has the form of the articulating ends of the bones, that is, the natural form of the articulation. No fluctuation is perceptible, as where the synovial membrane is inflamed; nor is there the pe-

culiar elasticity, which exists where the synovial membrane has undergone a morbid alteration of its structure.

But a few cases occur in which the tumor arises from fluid being collected in the joint; and in which therefore it has a form different from that which has been described, and giving to the hand a distinct feeling of fluctuation. 1. Inflammation of the synovial membrane may occur as a secondary disease, ulceration of the cartilage having preceded it, and the effusion of synovia into the joint being the consequence of it. This I suppose to have happened in the case of John Child related in another part of this paper. 2. In an advanced stage of ulceration of the cartilages, when an abscess is formed, it occasions ulceration of the soft parts, and usually makes its way to the skin; but sometimes the pus is collected in the joint distending the synovial membrane, and causing a tumor very similar to that, which takes place from it being distended with synovia. If an accurate history can not be procured, (as very frequently happens) the surgeon must resort to other means of ascertaining whether the fluid collected in the joint be purulent or otherwise. Blisters may be applied, which very seldom fail to procure the absorption of the too abundant synovia, and never cause the absorption of pus. At a certain period of the disease, the fluid may even be evacuated by a puncture with a lancet, so as to put its nature beyond the reach of doubt. If it

prove to be synovia, and the puncture be made with caution, and the wound healed, no ill consequences will arise: and if it be pus, the evacuation of it may be useful in the child, and in the adult it enables us to ascertain that there is no chance of the ultimate preservation of the limb.

As the ulceration of the cartilages is sometimes followed by dislocation of the hip, so we find that dislocation occasionally takes place from the same cause in the knee. When there has been considerable destruction of the soft parts from abscesses and ulceration, the head of the tibia is gradually drawn backwards by the action of the flexor muscles, and lodged in the ham. The condyles of the femur make an unusual projection, and the articulating surfaces of the bones are partially or entirely separated from each other.

The symptoms produced by the ulceration of the cartilages of other joints correspond very nearly to those already described. The principal diagnostic mark is the pain, which is experienced in the beginning unattended by swelling. The pain is referred entirely to the part, which is the actual seat of the disease, except where the elbow is affected, in which case the more violent pain in this joint is accompanied by a slighter degree of pain in the wrist. In the very few instances, in which I have met with the disease in the shoulder, instead of being swollen, the joint has appeared

smaller than natural, in consequence of the wasting of the deltoid muscle.

The progress of the ulceration of the cartilages varies with respect to time, in different cases; but it is generally tedious. In one case where violent pain had existed in the knee with little or no swelling for two years and a half previous to amputation, I had an opportunity of examining the affected joint; and found the cartilages destroyed only for a small extent; a drachm and a half of pus in the articular cavity; and no morbid appearances in the soft parts, with the exception of a very slight inflammation, which had been induced in the synovial membrane, and the effusion of a minute quantity of coagulable lymph into the cellular texture on its external surface. I have already mentioned an instance, in which the pains in the lower limb existed for a whole year before they were sufficiently severe to attract the patient's serious attention. In this case no pus had formed in the joint, and the ultimate recovery was complete, without the smallest detriment to the motion of the limb. Sometimes however the progress of the disease is much more rapid. There is a man at this time in St. George's Hospital, in whom, in the course of four months, the destruction of the head of the femur and acetabulum was so considerable as to occasion a real shortening of the limb to the extent of an inch.

plained on the supposition of the acetabulum being filled with matter or solid substance, since this would cause the head of the femur to be pushed outwards rather than downwards. The fact is that there is only an apparent, and no real elongation of the limb. If the patient be placed on his back in a horizontal position, both thighs making the same angle with the pelvis, the foot on the diseased side may at first appear to be as much as two or three inches lower than the opposite foot; but if the distance be accurately measured from the anterior superior spinous process of the ilium to the patella, no difference is perceptible. The apparent elongation is produced by the position of the pelvis being altered, so that it no longer makes a right angle with the spine, and the crista of the ilium is visibly depressed below that of the opposite side *.

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portance with respect to the prognosis, to distinguish the apparent shortening of the limb in the early stage, from the real shortening which takes place in the advanced stage of the disease, since the latter is a very serious symptom, indicating the formation of an abscess with all its train of bad consequences; and the former furnishes no ground of alarm respecting the ultimate termination of the case.

The health of the patient usually suffers, even before abscesses have formed, from the want of exercise, pain, and particularly from the continued disturbance of his natural rest. I recollect no instance of an adult in whom abscesses had formed, and who did not ultimately sink exhausted by the hectic symptoms which these have induced. Children may recover in this ultimate stage of the disease, but seldom without a complete anchylosis of the joint. If suppuration has not taken place, I believe it rarely happens that the limb after the cure does not regain its natural degree of mobility *.

* However difficult the diagnosis of this disease of the hip may be in its early stage, it may be made with sufficient certainty when the disease is somewhat advanced. It is to be founded however not on a single symptom, but on the combination of symptoms, and on the history of their progress, so that no degree of experience can enable a surgeon to form his judgment correctly without a careful investigation of the circumstances of the case before him. The morbid affections most liable to be confounded

Where the cartilages of the knee are ulcerated, the pain is confined to the affected joint: at first it is slight and only occasional, and in the early stage of the disease it is completely relieved by remaining in a state of rest for a few days, but it returns as soon as he resumes the exercise of the limb. By degrees the pain becomes constant and

confounded with the ulceration of the cartilages of the hip are the following:

1. Inflammation of the synovial membrane of the hip, of which I have spoken in my former papers.

2. Chronic inflammation of the soft parts in the neighbourhood of the hip, terminating in the formation of a chronic abscess. Here there is pain, but more confined in its situation, than where the cartilages of the hip are ulcerated: the pain is less severe; less aggravated by the motion of the joint; not relieved in the same degree by rest; not attended by a flattening, and very soon followed by a tumefaction, of the nates.

3. The scrophulous disease which I have described in the Fourth Volume of the Medico-Chirurgical Transactions, beginning in the cancellous structure of the bones and afterwards occasioning ulceration of the cartilages, may affect the hip as well as the other joints. On this subject I hope to be able to offer some remarks in a future communication.

4. I have seen several cases, in which I suspected the symptoms to depend on a morbid affection of the sciatic nerve: and in which they bore a certain analogy to those of the disease in question. There was pain referred to the parts, to which the sciatic nerve is distributed; but not very severe nor materially aggravated in consequence of the disease being neglected. There was tenderness in the situation of the nerve on the posterior part of the hip and thigh: the tenderness being sometimes more considerable in one part than in another. The symptoms were relieved principally by the application of blisters over the trunk of the nerve, which was suspected to be the seat of the malady.

very severe, particularly at night, when it disturbs the patient by continually rousing him from his sleep. The pain is referred principally to the inside of the head of the tibia; is aggravated by motion, so that the patient keeps the limb in one position; but is unattended by any actual rigidity or stiffness of the joint, except in an advanced stage of the disease.

The ulceration of the cartilages of the knee differs with respect to its symptoms from inflammation of the synovial membrane in this, that the pain in the former is slight in the beginning, and gradually becomes very intense, which is the reverse of what happens in the latter. But there is another circumstance which forms a remarkable distinction, between the ulceration of the cartilages, and most other diseases, to which this joint is liable. The pain in the first instance is unattended by any evident swelling, which comes on never in less than four or five weeks, and often not till several months have elapsed from the commencement of the disease. The reason of this is too evident to require explanation, and it is equally unnecessary to point out the importance of it, as affording the means of making a more ready diagnosis. We must not indeed conclude indiscriminately, wherever there is a slight pain in the knee unattended by swelling, that the cartilages are in a state of ulceration, since it is evident that this symptom may equally arise from inflammation of the bones themselves, of the liga-

ments, of the fatty substance of the joint, or from simple nervous affection; and instances will occur to every surgeon, where there is reason to believe that the above-mentioned symptom arises from one or other of these causes. But when the pain continues to increase, and at last is very severe; when it is aggravated by the motion of the bones on each other, and when after a time a slight tumefaction of the joint takes place, such as I shall presently describe, we may conclude that the disease consists in an ulceration of the cartilaginous surfaces; and in all such cases, which have come under my observation, their subsequent progress, and the morbid appearances presented by dissection, when an opportunity has occurred of observing them, have fully confirmed this conclusion.

The swelling, which attends this disease in the knee, differs from that, which occurs in either of those of the synovial membrane, which I have formerly described. It arises from a slight degree of inflammation having taken place in the cellular membrane external to the joint, in consequence of the disease within it. The swelling is usually trifling, appearing greater than it really is in consequence of the wasting of the muscles of the limb. It has the form of the articulating ends of the bones, that is, the natural form of the articulation. No fluctuation is perceptible, as where the synovial membrane is inflamed; nor is there the pe-

culiar elasticity, which exists where the synovial membrane has undergone a morbid alteration of its structure.

But a few cases occur in which the tumor arises from fluid being collected in the joint; and in which therefore it has a form different from that which has been described, and giving to the hand a distinct feeling of fluctuation. 1. Inflammation of the synovial membrane may occur as a secondary disease, ulceration of the cartilage having preceded it, and the effusion of synovia into the joint being the consequence of it. This I suppose to have happened in the case of John Child related in another part of this paper. 2. In an advanced stage of ulceration of the cartilages, when an abscess is formed, it occasions ulceration of the soft parts, and usually makes its way to the skin; but sometimes the pus is collected in the joint distending the synovial membrane, and causing a tumor very similar to that, which takes place from it being distended with synovia. If an accurate history can not be procured, (as very frequently happens) the surgeon must resort to other means of ascertaining whether the fluid collected in the joint be purulent or otherwise. Blisters may be applied, which very seldom fail to procure the absorption of the too abundant synovia, and never cause the absorption of pus. At a certain period of the disease, the fluid may even be evacuated by a puncture with a lancet, so as to put its nature beyond the reach of doubt. If it

prove to be synovia, and the puncture be made with caution, and the wound healed, no ill consequences will arise: and if it be pus, the evacuation of it may be useful in the child, and in the adult it enables us to ascertain that there is no chance of the ultimate preservation of the limb.

As the ulceration of the cartilages is sometimes followed by dislocation of the hip, so we find that dislocation occasionally takes place from the same cause in the knee. When there has been considerable destruction of the soft parts from abscesses and ulceration, the head of the tibia is gradually drawn backwards by the action of the flexor muscles, and lodged in the ham. The condyles of the femur make an unusual projection, and the articulating surfaces of the bones are partially or entirely separated from each other.

The symptoms produced by the ulceration of the cartilages of other joints correspond very nearly to those already described. The principal diagnostic mark is the pain, which is experienced in the beginning unattended by swelling. The pain is referred entirely to the part, which is the actual seat of the disease, except where the elbow is affected, in which case the more violent pain in this joint is accompanied by a slighter degree of pain in the wrist. In the very few instances, in which I have met with the disease in the shoulder, instead of being swollen, the joint has appeared

smaller than natural, in consequence of the wasting of the deltoid muscle.

The progress of the ulceration of the cartilages varies with respect to time, in different cases; but it is generally tedious. In one case where violent pain had existed in the knee with little or no swelling for two years and a half previous to amputation, I had an opportunity of examining the affected joint; and found the cartilages destroyed only for a small extent; a drachm and a half of pus in the articular cavity; and no morbid appearances in the soft parts, with the exception of a very slight inflammation, which had been induced in the synovial membrane, and the effusion of a minute quantity of coagulable lymph into the cellular texture on its external surface. I have already mentioned an instance, in which the pains in the lower limb existed for a whole year before they were sufficiently severe to attract the patient's serious attention. In this case no pus had formed in the joint, and the ultimate recovery was complete, without the smallest detriment to the motion of the limb. Sometimes however the progress of the disease is much more rapid. There is a man at this time in St. George's Hospital, in whom, in the course of four months, the destruction of the head of the femur and acetabulum was so considerable as to occasion a real shortening of the limb to the extent of an inch.

II.

I have remarked in a former communication that "the improvement of scientific pathology seldom leads to the invention of new remedies." But pathological investigations may be nevertheless of the highest practical utility, by enabling us to know diseases from each other, which otherwise would be confounded together; to form a more ready and a more accurate opinion respecting their probable termination; to estimate the chance of cure, and the time in which it may be effected; and amid the variety of remedies which may be usefully employed to distinguish what are applicable to one and what to another description of cases.

Where the cartilages of a joint are ulcerated, it may well be supposed that the motion of their surfaces on each other must be favourable to the progress of the ulceration. I have known some cases, in which rest alone was sufficient to produce a cure. In all cases the symptoms of the disease are aggravated by any considerable exercise: and we may therefore conclude that the keeping the limb in a state of perfect quietude, is a very important, if not the most important, circumstance to be attended to in the treatment.

Issues made with caustic have been recommended by many practitioners for the cure of diseased

joints, but; as far as I know, no one has attempted to point out the particular class of cases, to which this remedy is applicable. I have employed caustic issues, and seen them employed in a great number and variety of instances, and have found them to be usually productive of singular benefit where ulceration of the cartilages occurs as a primary disease, but of little or no service in any of the other morbid affections to which the joints are liable *. Setons and blisters kept open by means of the savine cerate appear to operate nearly in the same manner as caustic issues, and may be used with advantage in the same description of cases.

* The immediate relief which sometimes follows the application of caustic to the skin, or surface of the issue, even when the limb is under precisely the same circumstances as before with respect to rest, and the return of the symptoms which in many instances follows the early healing of the issue, sufficiently prove the efficacy of this remedy. It may be difficult to explain the *modus operandi*; but what happens in these cases seems to bear no distant analogy to the suspension of gonorrhœa, by the occurrence of inflammation of the testicle, or the metastasis of the gout from the stomach to the foot. Issues are employed in surgery for the purpose of stopping the morbid actions of the animal body; but it is probable that if made of sufficient extent they would interfere with its natural actions also. In a Guinea pig a large abscess of one leg and thigh took place in consequence of a local injury. The formation of the abscess completely stopped the growth of the claws on the foot of this side. They wore away at the points, without being regenerated at the base, became short and dry, and readily cracked and splintered: while on the foot of the opposite limb they continued to grow as usual, and possessed their ordinary appearance.

In many instances which occur (particularly in hospital practice,) the patient from too freely exercising the limb brings on an inflammation of the ulcerated surfaces of the bones, occasioning an aggravation of the pain, and usually some degree of fever, and here bleeding may be employed with advantage. Under other circumstances I have not known the loss of blood to be productive of much, if any benefit. Indeed I know of no analogy that should lead us to expect benefit from it, since bleeding is not found to possess the power of stopping the progress of ulcers in other parts.

In the early stage the warm bath is of service. At least it is capable of relieving the symptoms, if not of stopping the progress of the disease.

Plasters made of gum ammoniac and others of a similar nature; embrocations and liniments of all kinds, are entirely inefficacious. Friction is invariably injurious.

Having premised these general observations, I shall proceed to offer a few practical remarks: first, on the treatment of this disease in the hip, and afterwards in other joints without reference to suppuration having taken place; secondly, on the plan, which should be adopted where suppuration is established, and there is a collection of pus communicating with the articular cavity.

Where the cartilages of the hip are ulcerated, the patient should in the first instance be confined to a couch, if not to his bed; and if the disease is far advanced, the limb should be supported by pillows properly disposed, so as to favour the production of an anchylosis, by allowing it to vary as little as possible from one position.

In young children, blisters are capable of affording complete relief. They may be applied on the nates, round the great trochanter, and in the groin. A blister kept open by the savine cerate, is usually more efficacious than a number of blisters applied, and healed in succession.

In children above the age of eight or ten years, and in adults the same treatment is useful in the very early stage of the disease; but in the more advanced stage, issues made with caustic appear to be much more efficacious, and to be attended on the whole with less inconvenience to the patient.

The hollow behind the great trochanter of the femur is in many respects the most convenient situation for the application of the caustic; but in some instances the application of it on the outside of the hip is attended with better effects. The skin at this part is in fact nearer to the joint than the skin behind; and there are some grounds for the opinion, that issues are more efficacious when made

near to the seat of the disease, than when made at a distance from it*. The skin in the groin is still nearer to the hip than that on the outside, but the large vessels and nerves of the thigh forbid the use of the caustic at this part. A slough may be made with the *potassa fusa*, in the adult, half an inch in breadth, and two inches in length, behind the great trochanter. If this fails in giving relief, a second slough of a smaller size may be made on the anterior edge of the *tensor vaginæ femoris* muscle: and in some instances though no relief is afforded by the first issue, there is great relief from the second.

The good derived from the issue does not seem to be in proportion to the quantity of pus discharged from its surface. It has been observed by others, that sometimes more abatement of the symptoms is produced in the first few days after the caustic is applied, and before the slough has

* "I have for many years applied caustics above and below the internal condyle of the thigh-bone, for white swellings in the knee, with various success; and I have remarked, where this plan disappointed my hopes, and where a suppuration took place in the joint, that the inflammation in almost every case arose, and that the matter collected generally made its way outwards, on the external side of the knee. Observing this fact repeatedly, I was led to conceive that the caustic, in the manner I used it checked the progress of the disease, as far as it had influence; but that that influence was not sufficiently powerful to pervade the whole cavity of the joint." Ford on the Hip Joint. P. 194. First Edition.

separated, than in several weeks afterwards. This circumstance first led me, instead of employing beans for this purpose, to keep the issue open simply by rubbing the surface with the caustic potash, or the sulphate of copper, twice or three times in a week; and, after an extensive trial of both methods, the latter has appeared to be on the whole preferable to the former. The pain produced by the caustic is very considerable, but the relief of the symptoms is such, that I have known patients to be in the habit of making the application themselves, saying that "they knew that they should be better by the next morning." Besides, the issue is more easily dressed than where beans are used; and the inconvenience arising from the beans slipping out under the adhesive plaster, and from any accidental pressure of them against the sore surface is avoided.

The cases in which complete relief of the symptoms immediately follows the making the issue are not very numerous. In general, there is some degree of abatement on the caustic being applied, and in a few weeks afterwards, (provided that suppuration has not yet taken place) if the patient continues in a state of quietude, the pain entirely leaves him. Where the pain is exceedingly severe (as it sometimes is, so as to prevent sleep during successive nights,) it is very desirable that some method should be adopted, capable of affording

more speedy relief, than that which can usually be obtained from the application of the caustic. If there is reason to believe that the ulcerated surfaces are in a state of inflammation, in consequence of the joint having been too much exercised, bleeding may be had recourse to. A blister may be applied in the groin, and repeated if necessary. Blisters applied to the knee, though there is no actual disease in this joint, will often occasion considerable, or even entire, relief of the pain, which is referred to it from its sympathy with the affection of the hip. This is a very curious circumstance; but I have known it to happen in so many instances, that, however difficult it may be to explain it, I can entertain no doubt of the fact. An example of it is afforded by two boys at this time in St. George's Hospital. One of them, before his admission, complaining of pain in the knee; the practitioner under whose care he was, applied a blister to this joint. The pain immediately (according to the boy's account) left the knee, and attacked the hip. The other, while in the hospital, laboured under pain in the hip and knee also. A blister having been applied to the knee, the pain in it completely subsided, while that in the hip continued.

The objections which may be urged against applying the caustic to the skin in the groin, do not hold good with respect to a seton, in this situation. I was led to adopt this treatment some years ago,

partly from observing that the skin of the groin is nearer to the hip joint, than the skin elsewhere; partly from an expectation (though not a very confident one) that the making a seton over the trunk of the anterior crural nerve, might be particularly calculated to relieve the pain, referred to those parts, to which the branches of that nerve are distributed. The results of this practice more than realized whatever hopes I had entertained of its success. The following are extracted from notes, which were taken formerly, when I began making observations on this subject.

"November, 1808. Martha Atkinson, 15 years of age, laboured under symptoms of ulceration of the cartilages of the hip. She had pain in the hip and knee, but that in the hip was the most severe of the two. Her sufferings were such, that she could scarcely venture to make the slightest alteration in her position during the day, and she could procure scarcely any rest at night.

"November, 20. A seton was made in the groin.

"November 22. The pain in the hip was almost completely relieved, and from this time she mended rapidly."

"John Selly, 11 years of age, was admitted into St. George's Hospital, on the 28th of December, 1808, with severe pain in the hip and knee, tender-

ness in the region of the hip, and enlargement of the glands in the groin.

"December 30th, a seton was made in the groin. The pains in the hip and knee were almost entirely relieved within a few hours after the seton was introduced. The relief was permanent; and on the 24th of May following, he left the hospital as cured."

"Susan Dean, about 12 years of age, was admitted into St. George's Hospital, in November, 1808, with very severe pains in the hip and knee, in consequence of disease in the former joint. A large abscess presented itself on the upper and outer part of the thigh.

"On the 4th of December, a seton was made in the groin. The pains were relieved on the same afternoon. She had no return of pain while she continued in the hospital; but as her friends took her away in a few weeks after the seton was made, I had no opportunity of observing the termination of the case."

"James Craven, a young man, was admitted an out-patient of St. George's Hospital, on the 15th of March, 1809, with the usual symptoms of ulceration of the cartilages of the hip. There was a large abscess on the outside of the thigh; and intense pain in the knee, preventing his rest at night.

"March 16. A seton was made in the groin. Being unable to become an in-patient of the hospital, he walked home afterwards. Nevertheless the pain was completely relieved in a few hours; and he slept soundly at night, the pain not at all disturbing him.

"After this the abscess burst, and collected again several times; and he became affected with hectic symptoms. I did not see the termination of this case, but I make no doubt of it having ended fatally."

These were the results of this mode of practice in the first few cases in which it was adopted. In some cases indeed it has failed in producing the like good effects; but these cases have borne only a small proportion to those in which it has succeeded. On the whole I am led to conclude that where the pain is very severe, the seton in the groin is more likely to afford immediate relief, than the caustic issue; but that it is not equally efficacious in checking the progress of the disease, as in lessening the violence of its symptoms; and that the caustic issue can be better depended on for the production of a cure.

To make the seton in the groin, it is convenient to use a curved seton needle. In the greater number of instances the patient keeps the thigh bent considerably on the pelvis, and this position of the limb renders it difficult to employ a needle of the

usual form. The seton may be introduced obliquely on the anterior part of the joint, including from one inch and a half, to two inches of integuments. After some time the skin over it usually inflames and ulcerates, and the seton drops out; but this does not happen before it has produced all the benefit which may be expected from it.

Of the above observations on the ulceration of the cartilages of the hip, many are applicable to the disease in other joints. In all cases a state of the most perfect quietude is indispensable. Where the disease is in the lower extremity, the patient should be confined to the horizontal position; where it is in the upper, the arm should be supported in a sling. Where the knee or elbow is affected, we may employ the caustic issue, or the blister kept open with the savine cerate; but the former appears to be the most efficacious of the two. In the knee a narrow slough may be made by rubbing the skin with the *potassa fusa* on each side of the patella; and in the elbow the caustic may be applied in the same manner on the inside and on the outside of the joint. Where the disease has its seat in those joints, which are surrounded by numerous tendons, as the wrist or ankle, or the joints of the carpus or tarsus, it may be more prudent to employ the blister kept open with the savine cerate, lest injury should be done to the superficial tendons, by the application of the caustic. Where I have met with this disease in the shoulder,

it has yielded to the same remedy; but there is no reason why the caustic issue should not be employed here as well as in the hip or knee.

The treatment of the abscess which arises from this disease in a joint makes a question of very serious importance, but more so as it regards children than adults; since the former may, and do frequently recover even after extensive suppuration has taken place; whereas whatever has been the practice employed, I recollect no instance of a limb having been ultimately preserved under these circumstances in the grown up person *.

I have not found that the method of evacuating the matter, which has been recommended by Mr. Abernethy, in his treatise on the lumbar abscess, is attended with any particular advantage in a case of carious joint. Indeed this corresponds with what a little consideration might lead us to expect. If an abscess takes place as a primary affection, the disease being confined to the soft parts, there may be nothing to prevent the contraction of its cyst, and the gradual diminution of the quantity of pus evacuated at each puncture. But where an abscess occurs, in consequence of an ulcerated state of the articular cartilages, and bones, as the cause of the abscess exists equally after the puncture as before it, the suppuration will necessarily be kept up, and

* It is to be observed, that I speak here only of the abscess in a joint, which is the consequence of ulceration of the cartilage occurring as a primary disease.

the contraction of the cyst and the obliteration of its cavity will be prevented.

In some instances I have been led to believe that after the application of the caustic, the tumor formed by the abscess has diminished in size, as if from an absorption of a portion of its contents. I have however seen no instance of complete absorption having taken place, though I have made various attempts to produce so desirable an effect. Nauseating doses of ipecacuanha and emetic tartar were, in my experiments, of no service. Electricity was never useful; appearing rather to occasion a more rapid accumulation of matter. Knowing that pressure under certain circumstances, causes an increased action of the absorbent vessels, in two cases I applied stripes of adhesive plaster round the limb, with the view of trying the effects of pressure on the contents of the abscess. The consequence was a speedy diminution of the external tumor; but I afterwards found, that this arose not from any absorption having taken place; but simply from the increased resistance on the surface, causing the abscess to occupy a larger space in the interior of the limb.

The early puncture of an abscess connected with a diseased joint is certainly not to be recommended. I have always observed that such an abscess has healed more readily, and that the opening of it, (whether by a natural process, or by the lancet,) has been attended with fewer ill conse-

quences, where the patient has been kept for some time in a state of quietude, and where the other methods of treatment formerly mentioned, have been previously resorted to, than where it has taken place immediately on the patient coming under the care of the surgeon. Nor is this difficult to explain: in the latter case, at the bottom of the abscess there is a carious or ulcerated surface of bone: in the former, it is highly probable, that the process of cure has already begun, so that where there was diseased bone before, there is now a granulating surface. At any rate it cannot be supposed that, where, in consequence of the neglect of the disease, the ulcerated bones, as well as the other parts, are in a state of inflammation, the abscess can be under such favourable circumstances for being opened, as where such inflammation has been previously allowed to subside, under rest, and the employment of proper remedies.

An abscess connected with any joint, but particularly one connected with the hip, does not form a regular cavity; but usually makes numerous and circuitous sinuses in the interstices of the muscles, tendons, and fasciæ, before it presents itself under the integuments. It is therefore less easy to evacuate its contents, than those of an ordinary lumbar abscess; and indeed it can seldom be completely emptied without handling and compressing the limb, in order to press the matter out of the sinuses in which it lodges. But this is often at-

tended with very ill consequences. Inflammation takes place of the cyst of the abscess, and pus is again very rapidly accumulated. Small blood-vessels give way on its inner surface, the bloody discharge of which, mixed with the newly secreted pus, goes into putrefaction, and exceedingly irritates the general system. I have seen cases where, after a great deal of pains having been taken to obtain the complete evacuation of the contents of the abscess, and the puncture having been healed, in a few days the tumor has become as large as ever, attended with pain in the limb, and a fever resembling typhus in its character, and threatening the life of the patient. A second puncture having been made, a quantity of putrid fœtid pus, of a reddish brown colour, has escaped; the confinement of which had produced all the bad symptoms, which have been immediately relieved by its evacuation.

The practice which has appeared to me to be on the whole the best, is the following. An opening being made with an abscess lancet, the limb may be wrapped up in a flannel wrung out of hot water, and this fomentation may be continued as long as the matter continues to flow of itself. In general when a certain quantity has escaped, the discharge ceases, the orifice heals, and the puncture may then be repeated some time afterwards; but where the puncture has not become closed, I have not found any ill consequences to arise from its remaining open.

The occurrence of suppuration is a circumstance of importance for the surgeon to attend to in making his prognosis. The formation of even the smallest quantity of pus in the joint in cases of this disease, in the young person considerably diminishes, and in the adult almost precludes, the hope of ultimate recovery. On the other hand, where abscess has not begun to form, there is perhaps no disease, among those which come under the care of the surgeon, in which he can employ his art with a better prospect of success than this. It is to be observed, however, that the symptoms may be relieved while there are still some remains of the disease; or, at any rate, while there is still a disposition to relapse; and in order that the cure should be permanent, it is necessary that the treatment should be continued for some time after the patient is apparently recovered. A gentleman who had long laboured under ulceration of the cartilages of the hip, finding himself free from all uneasiness, allowed the issue to heal. This was attended with no immediate ill consequences, but in the course of two or three months, he began to experience the well known symptoms of his former complaint. A caustic issue was again made, and he was again relieved. The issue was kept open for twelve months and then healed. At the present time (two or three years since) he continues perfectly well. This, however, is only one of many cases which might be quoted in proof of the above observation.

III.

Perhaps the history of diseases can in no way be so well rendered intelligible as by the relation of particular cases. Those, of which I propose to give an account in the remaining part of this paper, will serve at any rate to illustrate some of the observations which I have now made, as well as the remarks contained in the last communication which I had the honour of presenting to this Society, on the subject of the diseases of the synovial membranes. Whoever will take the pains to compare these cases with each other, and to look for corresponding cases in practice, will, if I am not exceedingly mistaken, be convinced that the distinction of the different diseases of the joints is not a mere matter of curiosity, which may be interesting to the morbid anatomist; but that these diseases are different in their progress, that they produce different symptoms, by which they may be known from each other in the living person, and which indicate the employment of different remedies in different cases.

Cases of Inflammation of the Synovial Membrane.

The three following cases shew the principal circumstances which occur in this disorder, and the varieties to which it is subject. The first affords an instance of inflammation of the synovial mem-

brane in its simplest form, occasioning little else than an effusion of fluid into the articular cavity. In the second, coagulable lymph was effused in considerable quantity into the joint, but active treatment having been employed in the beginning of the disease, before the effused lymph had become organized, it was absorbed, and the knee regained its natural size and its natural degree of mobility.

The third case is an example of the effects of long continued and neglected inflammation of the synovial membrane. The joint was permanently swollen and stiff, in consequence of the synovial membrane having become thickened, and probably from its surfaces being encrusted by organized coagulable lymph: and, as always happens under these circumstances, the patient was liable to a recurrence of the disease from slight causes. This case also shews how long the synovial membrane may continue inflamed, and how frequently the inflammation may recur without affecting the bones or cartilages of the articulation.

CASE I.

John Adams, 47 years of age, on the 21st of August, 1811, was seized with a pain in his left knee, and in the course of a few hours he found the

the contraction of the cyst and the obliteration of its cavity will be prevented.

In some instances I have been led to believe that after the application of the caustic, the tumor formed by the abscess has diminished in size, as if from an absorption of a portion of its contents. I have however seen no instance of complete absorption having taken place, though I have made various attempts to produce so desirable an effect. Nauseating doses of ipecacuanha and emetic tartar were, in my experiments, of no service. Electricity was never useful; appearing rather to occasion a more rapid accumulation of matter. Knowing that pressure under certain circumstances, causes an increased action of the absorbent vessels, in two cases I applied stripes of adhesive plaster round the limb, with the view of trying the effects of pressure on the contents of the abscess. The consequence was a speedy diminution of the external tumor; but I afterwards found, that this arose not from any absorption having taken place; but simply from the increased resistance on the surface, causing the abscess to occupy a larger space in the interior of the limb.

The early puncture of an abscess connected with a diseased joint is certainly not to be recommended. I have always observed that such an abscess has healed more readily, and that the opening of it, (whether by a natural process, or by the lancet,) has been attended with fewer ill conse-

quences, where the patient has been kept for some time in a state of quietude, and where the other methods of treatment formerly mentioned, have been previously resorted to, than where it has taken place immediately on the patient coming under the care of the surgeon. Nor is this difficult to explain: in the latter case, at the bottom of the abscess there is a carious or ulcerated surface of bone: in the former, it is highly probable, that the process of cure has already begun, so that where there was diseased bone before, there is now a granulating surface. At any rate it cannot be supposed that, where, in consequence of the neglect of the disease, the ulcerated bones, as well as the other parts, are in a state of inflammation, the abscess can be under such favourable circumstances for being opened, as where such inflammation has been previously allowed to subside, under rest, and the employment of proper remedies.

An abscess connected with any joint, but particularly one connected with the hip, does not form a regular cavity; but usually makes numerous and circuitous sinuses in the interstices of the muscles, tendons, and fasciæ, before it presents itself under the integuments. It is therefore less easy to evacuate its contents, than those of an ordinary lumbar abscess; and indeed it can seldom be completely emptied without handling and compressing the limb, in order to press the matter out of the sinuses in which it lodges. But this is often at-

tended with very ill consequences. Inflammation takes place of the cyst of the abscess, and pus is again very rapidly accumulated. Small blood-vessels give way on its inner surface, the bloody discharge of which, mixed with the newly secreted pus, goes into putrefaction, and exceedingly irritates the general system. I have seen cases where, after a great deal of pains having been taken to obtain the complete evacuation of the contents of the abscess, and the puncture having been healed, in a few days the tumor has become as large as ever, attended with pain in the limb, and a fever resembling typhus in its character, and threatening the life of the patient. A second puncture having been made, a quantity of putrid fœtid pus, of a reddish brown colour, has escaped; the confinement of which had produced all the bad symptoms, which have been immediately relieved by its evacuation.

The practice which has appeared to me to be on the whole the best, is the following. An opening being made with an abscess lancet, the limb may be wrapped up in a flannel wrung out of hot water, and this fomentation may be continued as long as the matter continues to flow of itself. In general when a certain quantity has escaped, the discharge ceases, the orifice heals, and the puncture may then be repeated some time afterwards; but where the puncture has not become closed, I have not found any ill consequences to arise from its remaining open.

The occurrence of suppuration is a circumstance of importance for the surgeon to attend to in making his prognosis. The formation of even the smallest quantity of pus in the joint in cases of this disease, in the young person considerably diminishes, and in the adult almost precludes, the hope of ultimate recovery. On the other hand, where abscess has not begun to form, there is perhaps no disease, among those which come under the care of the surgeon, in which he can employ his art with a better prospect of success than this. It is to be observed, however, that the symptoms may be relieved while there are still some remains of the disease; or, at any rate, while there is still a disposition to relapse; and in order that the cure should be permanent, it is necessary that the treatment should be continued for some time after the patient is apparently recovered. A gentleman who had long laboured under ulceration of the cartilages of the hip, finding himself free from all uneasiness, allowed the issue to heal. This was attended with no immediate ill consequences, but in the course of two or three months, he began to experience the well known symptoms of his former complaint. A caustic issue was again made, and he was again relieved. The issue was kept open for twelve months and then healed. At the present time (two or three years since) he continues perfectly well. This, however, is only one of many cases which might be quoted in proof of the above observation.

III.

Perhaps the history of diseases can in no way be so well rendered intelligible as by the relation of particular cases. Those, of which I propose to give an account in the remaining part of this paper, will serve at any rate to illustrate some of the observations which I have now made, as well as the remarks contained in the last communication which I had the honour of presenting to this Society, on the subject of the diseases of the synovial membranes. Whoever will take the pains to compare these cases with each other, and to look for corresponding cases in practice, will, if I am not exceedingly mistaken, be convinced that the distinction of the different diseases of the joints is not a mere matter of curiosity, which may be interesting to the morbid anatomist; but that these diseases are different in their progress, that they produce different symptoms, by which they may be known from each other in the living person, and which indicate the employment of different remedies in different cases.

Cases of Inflammation of the Synovial Membrane.

The three following cases shew the principal circumstances which occur in this disorder, and the varieties to which it is subject. The first affords an instance of inflammation of the synovial mem-

brane in its simplest form, occasioning little else than an effusion of fluid into the articular cavity. In the second, coagulable lymph was effused in considerable quantity into the joint, but active treatment having been employed in the beginning of the disease, before the effused lymph had become organized, it was absorbed, and the knee regained its natural size and its natural degree of mobility.

The third case is an example of the effects of long continued and neglected inflammation of the synovial membrane. The joint was permanently swollen and stiff, in consequence of the synovial membrane having become thickened, and probably from its surfaces being encrusted by organized coagulable lymph: and, as always happens under these circumstances, the patient was liable to a recurrence of the disease from slight causes. This case also shews how long the synovial membrane may continue inflamed, and how frequently the inflammation may recur without affecting the bones or cartilages of the articulation.

CASE I.

John Adams, 47 years of age, on the 21st of August, 1811, was seized with a pain in his left knee, and in the course of a few hours he found the

joint to be swollen. This was accompanied by a slight attack of fever.

On the 28th of August he was admitted into St. George's Hospital. At this time the knee was extremely painful and tender, and much swollen: the swelling not having the form of the articulating ends of the bones, but being most prominent on the anterior and lower part of the thigh, underneath the lower portion of the extensor muscles. The fluctuation of fluid might be distinctly felt within the synovial membrane.

Eight ounces of blood were taken from the knee by cupping. The loss of blood was immediately followed by an abatement of the pain, tenderness, and swelling. On the 30th of August a blister was applied.

The cupping was repeated on the 9th and 18th of September, and on the 4th of October, and each time was followed by the application of a blister.

On the 10th of October the joint was free from all pain and tenderness; it was stiff, and still slightly swollen, but no fluid was perceptible, the swelling appearing to arise entirely from solid substance. He was directed to use a liniment twice in the day.

On the 18th of October there had been no re-

turn of inflammation; and the stiffness and swelling were diminished. Friction was now employed by means of the hand with starch-powder every morning and evening: and in a few days afterwards it was directed (in addition to the friction) that hot water should be pumped on the joint so as to fall on it from a height of several feet, for half an hour every morning.

About the middle of November he was dismissed from the hospital; the joint being now nearly as small and as moveable as before the inflammation had taken place.

CASE II.

Robert Stewart, 18 years of age, was admitted into St. George's Hospital on the 26th of January, 1814.

About seven weeks before his admission, he said that the right knèe became swollen and painful, without any evident cause. The pain and swelling took place about the same time: the pain was severe, and attended with some degree of fever. About a fortnight before his admission, the joint was cupped, and the swelling and pain became much diminished, and the leg more moveable. The cupping had been repeated on the day pre-

vious to his coming to the Hospital, and again afforded him relief.

At the time of his being admitted into the Hospital, the knee was still much swollen; the swelling extending up the anterior and lower part of the thigh under the extensor muscles. The swelling appeared to arise chiefly from solid substance effused within the articulation; very little fluid being to be distinguished. There was but little pain or tenderness; the joint admitted of a limited motion; he said it was less stiff than it had been a short time before.

On the 27th of January, eight ounces of blood were taken from the knee by cupping, and afterwards a blister was applied.

On the 5th of February the blister was healed. The swelling was much diminished. The solid substance which had been effused was in great measure absorbed, so that the form of the articulating ends of the bones could be distinguished. The blister was repeated.

On the 18th of February the joint was scarcely larger than natural, but it was still stiff in a slight degree. The stiffness disappeared under the employment of friction with mercurial ointment and camphor: and on the 23d of February he was dismissed from the hospital as cured.

CASE III.

John Hannam, a stout middle-aged man, was admitted into St. George's Hospital, under Mr. Keate, on the 22d of May, 1811. He said, that six years ago he had wrenched his right knee, which in a few hours became stiff and swollen. In the course of a month the pain and swelling subsided, and he was able to return to his duty as a soldier in one of the regiments of Life-Guards, but from that period he experienced what he termed a weakness of the joint; and he had a return of pain and swelling, whenever he made any unusual exertion. A year and a half previous to his coming to the Hospital, he was ill of a fever. From this time the knee was more swollen and painful, and he continued in this state, sometimes better, sometimes worse, so that he was unable to do his duty, and he was in consequence discharged from his regiment.

At the time of his admission, the knee was swollen, partly from fluid in its cavity, partly from thickening of the soft parts. The swelling extended some way up the anterior part of the thigh, and was prominent on each side of the ligament of the patella. The joint was stiff; but admitted of incomplete flexion and extension. He complained of some degree of pain when at rest; but the pain was more severe whenever he attempted to ex-

ercise the limb. There was an enlarged lymphatic gland in the ham.

The knee was cupped several times, while the patient remained in the Hospital. Blisters and stimulating liniments were employed; and about the end of September he left the hospital, better than when he was admitted; but there was still pain whenever he made any unusual exertion, and the joint was stiff and swollen, though in a less degree than formerly. The swelling now appeared to arise altogether from solid substance, no fluid being perceptible.

Fifteen months afterwards I had an opportunity of seeing him again. There was very little alteration in the state of the knee. He said, that whenever he took more exercise than usual, or was exposed to cold, inflammation took place, and the swelling was increased; but that by remaining for a short time in a state of quietude, those symptoms were always relieved.

Cases in which the synovial membrane had undergone a morbid alteration of structure.

The three following cases afford examples of a disease which I described in my late communications to this Society; they will be found to illus-

trate the most remarkable circumstances in its history and symptoms, and to confirm fully the observations which I formerly made respecting it. In two of these cases, the disease could be traced to no evident cause; in the third it appears to have originated in repeated attacks of inflammation. In the two first, the nature of the disease was so distinctly marked by the previous history and the present symptoms, that the nature of it was immediately recognised by the students of the hospital; in the third case, the history being more obscure, the diagnosis was less easy. The first case, in which the patient was admitted into the hospital at a very early period, so as to admit the trial of different remedies, furnishes one of many examples which might be adduced to prove that this morbid affection is incapable of a cure, at least by any method which has been hitherto suggested.

CASE IV.

John Dillemore, 13 years of age, was admitted into St. George's Hospital in the summer of 1812, on account of a disease in one knee. At that time the joint was slightly swollen and stiff, so as to admit of only a very limited degree of motion. He was free from pain. The swelling was elastic, without any evident fluctuation of fluid. These symptoms had been coming on gradually about two

years previous to his admission. At this time he remained in the hospital for upwards of three months; and a great number of remedies, which it is unnecessary to enumerate, were employed without the smallest benefit.

On the 26th of January, 1814, he was re-admitted into the hospital. The affected knee was now about two inches and a half in circumference more than the other. The swelling was elastic; it extended up the anterior and lower part of the thigh, as in cases of inflamed synovial membrane, but its form was less regular, being more prominent and extending higher up on the outside than on the inside. The leg was kept in the half-bent position, and was perfectly immoveable on the thigh. He was subject to occasional attacks of violent pain. He said that the swelling had gradually increased from the period of his quitting the hospital in 1812, but that he had not been subject to very severe pain till about six weeks previous to his re-admission.

On the 31st of January the limb was amputated.

On examining the diseased joint, the synovial membrane was found converted into a pulpy substance of a light brown colour, with red spots arising from vessels ramifying in it, injected with their own blood, and intersected by very numerous membranous lines. On the outside of the joint,

the diseased membrane was in some parts nearly an inch in thickness. The membrane covering the cartilages in some parts was in a natural state; in other parts it had undergone the same morbid change of structure as elsewhere. The cartilages were ulcerated in spots. There was about half an ounce of pus in the cavity of the joint; and there were two or three abscesses in the substance of the synovial membrane, not communicating with the joint, containing about the same quantity of purulent matter.

CASE V.

William Hine, 23 years of age, was admitted into St. George's Hospital, on the 12th of December, 1814, on account of a complaint in one of his knees. He said, that in the summer of 1812, he first observed a slight degree of stiffness and swelling of the joint, unattended by pain. At first the swelling was confined to the inside, but it gradually extended itself over the whole circumference of the joint. The stiffness and swelling slowly, but uniformly increased: about the end of the year 1813, he first began to experience considerable pain.

At the time of his admission, the knee was considerably swollen; the swelling was irregular, and most prominent on the inside; it was soft and elas-

tic, without the fluctuation of fluid. He complained of constant, deep-seated, gnawing pain, which disturbed his sleep. He had a slight degree of hectic fever.

On the 16th of December, the limb was amputated. On dissecting the amputated joint, the synovial membrane was found to have undergone the same morbid alteration of structure as in the last case. The cartilages were slightly ulcerated in a few spots.

CASE VI.

James Gould, 65 years of age, was admitted into St. George's Hospital, in May, 1814.

One knee was swollen and stiff, admitting of scarcely any motion. The swelling was elastic. He complained of severe pain in the joint. Near the ligament of the patella was the orifice of a sinus, communicating with the articular cavity, and discharging a very small quantity of pus. No clear history could be procured of the disease in its earlier stages, but it appeared that he had been subject to repeated attacks of inflammation of the synovial membrane.

The limb was amputated on the 23rd of May. On dissection, the ligaments, bones, cartilages, and

that portion of the synovial membrane which is reflected over the cartilages, were found to be in a natural state; but the synovial membrane in other parts had undergone the same morbid alteration of structure as in the two preceding cases.

Cases of ulceration of the articular cartilages.

I shall next lay before the Society an account of two cases of ulceration of the cartilages, in which an opportunity occurred of examining the affected joints. They will be found to confirm the pathological observations respecting this disease, contained in one of my former papers; and they are of some importance to the practical surgeon, as they shew the connection between certain morbid appearances, and the symptoms, by which they are indicated. From one of these cases, we learn to how great an extent, ulceration of the articular cartilages may take place without the secretion of pus. The other affords an example of a fact which I have observed in some other instances. If suppuration has commenced, but only a small quantity of pus is hitherto collected in the joint, by means of rest and caustic issues, the pain and other symptoms may be for a time relieved; but the suppuration continues notwithstanding, and, as the pus becomes accumulated in larger quantity, the symptoms return in greater violence than before.

CASE VII.

John Catnack, 44 years of age, was admitted into St. George's Hospital on the 29th of September, 1813, with pains in the lower limb of the right side, extending from the hip to the knee, and resembling the pains of rheumatism. He attributed these pains to his having caught cold about a month before his admission. He laboured also under a complaint of his bowels of which he died on the 4th of December.

On dissection, no preternatural appearances were discovered, except in the right hip. The capsular ligament and synovial membrane were in a natural state. The cartilages covering the head of the femur, and lining the bottom of the acetabulum, were destroyed by ulceration for about one-half of their extent, and wherever the cartilage was destroyed an ulcerated surface of bone was exposed. The round ligament was readily torn, in consequence of ulceration having extended to it at the part where it was inserted into the acetabulum. The bones possessed their natural texture and hardness. There was no pus in the joint. It was observed that the ulcerated surface of the acetabulum corresponded to that of the head of the femur, these surfaces being exactly in contact in the position in which the patient had remained since his admission into the hospital.

*CASE VIII**.

Mary Anderson, 28 years of age, was admitted into St. George's Hospital, on the 6th of April, 1815.

At this time she complained of intense pain in the right knee, which was particularly severe at night, so as exceedingly to interrupt her rest. The pain was referred principally to the head of the tibia. There was a slight swelling of the joint, having the form of the articulating ends of the bones, and not giving to the hand the smallest sense of fluctuation. The leg admitted of being moved on the thigh, but all motion aggravated the pain.

No more particular account of the previous history of the case could be procured than the following; that she had laboured under pains of the right knee for nearly six years, which had been occasionally relieved; and that in the first instance the pain had been unattended by swelling.

Immediately on her admission, an issue was made with caustic on each side of the patella. On the 9th of April, the pain had very much abated. The issues were kept open by the occasional application

* This, as well as one of the following cases, has been added since the Paper was read to the Society.

of caustic; and the pains very soon left her, and the swelling diminished.

About the 8th of June she began to experience a return of the pains in the knee, and in the course of four or five days they were so severe as to keep her awake at night. There were convulsive startings of the limb, and the joint was swollen in a greater degree than formerly. The pains increased in violence, and her health began to suffer considerably. On the 3rd of July the limb was amputated.

On examining the knee, some lymph and serum were found effused into the cellular membrane external to it.

The cavity of the joint contained about half an ounce of thin purulent fluid. The cartilage covering the patella was, in some parts, in a natural state; in others, it had the fibrous structure *, which I have described in a former communication; and in others, it was completely destroyed by ulceration, so as to expose the surface of the bone. The cartilage covering the articulating extremity of the femur, presented the same variety of appearances. On the inside, there was a spot of some extent, which, instead of cartilage, was covered by an organised substance, resembling the substance of adhesions,

* See Medico-Chirurgical Transactions, Vol. IV. p. 237.

but somewhat more dense in its structure, as if the cartilage had been formerly destroyed at this part, and coagulable lymph had been effused on the ulcerated surface of bone, which had afterwards become organized.

The cartilages of the tibia were ulcerated for a very small extent.

The synovial membrane in general was in a natural state. In some places, it was slightly inflamed. On the outside of the joint, it was inflamed in a greater degree than elsewhere, and thickened and had begun to ulcerate, evidently in consequence of the abscess in the joint having begun to make its way to the external surface.

The bones possessed their natural texture and hardness.

The following are selected from many similar cases of which I have preserved notes, and in which the patients recovered under the treatment described in the former part of this communication. There seems to be no doubt that the disease was ulceration of the articular cartilages, since the symptoms exactly corresponded with those which have been observed in cases of this description, in which an opportunity occurred of examining the morbid appearances after death or after amputation.

CASE IX.

Mary Jenkins, 21 years of age, in May, 1809, received a blow on one of her knees. Soon afterwards, she was seized with pain in the joint, which gradually became more severe. In September of the same year, she was admitted into St. George's Hospital, on account of this and some other complaints, which required medical treatment. At first she was under the care of Dr. Bancroft. On the 9th of November she came under the care of the surgeons. At this time the knee was somewhat swollen: the swelling having the form of the articulating ends of the bones, and appearing greater than it really was on account of the wasting of the muscles of the limb. No fluid was perceptible in the joint. She complained of violent pain, which she referred chiefly to the inside of the head of the tibia, and which was extremely aggravated by motion. There was no redness of the skin. She was emaciated, and laboured under a slight degree of hectic fever.

An issue was made with caustic on each side of the patella. The issues were kept open by means of peas: their surfaces being also rubbed with caustic every fourth day.

At the expiration of a fortnight, the pain was very much abated: she was able to give some mo-

tion to the joint without much uneasiness. The swelling had nearly disappeared.

In a little while the pain was completely relieved: however she did not quit the hospital until the September of the following year. At this time she was free from all bad symptoms, and had recovered the perfect use of the joint.

CASE X.

John Reade, 28 years of age, applied for relief as an out-patient at St. George's Hospital on the 4th of October, 1811.

He said that for two years preceding he had been subject to pains in the elbow, which were occasionally severe, but attended with little or no swelling. At the time of his coming to the hospital, the pain in the joint was very violent, particularly at night, when it continually roused him from his sleep. There was also pain in the shoulder and wrist, but trifling when compared to that in the elbow, and only occasional. The elbow was slightly swollen, the swelling having the form of the bones, and arising evidently not from fluid within the articulation, but from inflammation having extended to the cellular membrane external to it. The forearm was kept bent, and all attempts to move it

from this position caused a severe aggravation of the pain. There was some degree of symptomatic fever.

Eight ounces of blood were taken from the other arm, which occasioned some, but not considerable relief.

October 8, a caustic issue was made on each side of the joint.

October 11, he was free from the symptomatic fever; the pain in the shoulder and wrist had entirely left him; that in the elbow was much diminished.

October 16, the sloughs separated; the issues were kept open by the occasional application of caustic. He now made very little complaint of pain; and slept well at night. From this time he experienced very little uneasiness, he gradually recovered the use of the elbow, and in a few weeks, finding no inconvenience from the complaint, he ceased to attend at the hospital.

CASE XI.

Mary Taylor, 50 years of age, was admitted into St. George's Hospital on the 3d of December, 1809.

She said that in the preceding July, she had a violent wrench of the right shoulder, in consequence of her husband pulling her by the arm. Soon afterwards she was attacked by pain in this joint, which gradually became very severe. At the time of her admission into the hospital there was no alteration in the external appearance of the shoulder: there was not the smallest evident swelling; but she complained of constant and violent pain, which was much aggravated on every attempt to move the arm. The pain was most severe at night, so as very much to disturb her rest. She was unable to lie on the side on which the disease was situated.

The arm was supported by a sling, and a blister was applied to the shoulder, and kept open by means of savine cerate.

In less than a fortnight the symptoms were very much relieved. In the beginning of January, she had very little pain and slept well at night. About the middle of February, she was dismissed from the hospital, being free from all her former symptoms. She was directed to attend as an out-patient, that the blister might be kept open for some time longer. However she never made her appearance at the hospital again, probably in consequence of her finding no inconvenience from the complaint, and of her not

being convinced of the necessity of continuing the treatment after the symptoms were relieved.

CASE XII.

Anne White, 21 years of age, was admitted into St. George's Hospital on the 8th of January, 1814.

She said that three months before her admission she was seized with pain of the left knee. The pain was slight at first, but gradually increased in violence. In less than a month after the pain first attacked her the joint became slightly swollen. About a fortnight before her admission she was seized with a pain in her left elbow, unattended by swelling.

At the time of her applying at the hospital, the knee was swollen but only in a slight degree. The swelling had the form of the bones of the joint, evidently arising from an effusion into the cellular texture, and not from fluid within the synovial membrane.

During the day she had violent, but not constant, pain in the knee; the pain attacking her by fits lasting a few minutes. During the night

the pain was more constant, and very seyere so as to disturb her rest exceedingly. The pain when most violent extended down the leg and up the thigh. The joint was capable of motion; but all motion aggravated the pain. There was great tenderness on the inside of the knee; the skin was somewhat redder than natural, but the redness was greater at one period than at another. She complained also of pain in the elbow, extending up the arm and down the fore-arm. This joint was not at all swollen. She had lost flesh; had a white tongue; a quick small pulse, and was occasionally flushed.

Immediately on her admission leeches were applied to the knee, which somewhat relieved the pain in this joint. On the 11th of January, a caustic issue was made on each side of the elbow, and on the 13th of January, issues were also made on each side of the knee.

On the 17th of January, the pain in the elbow was almost completely relieved; that in the knee was somewhat less.

The issues were kept open by the occasional application of caustic. The pain and swelling of the knee gradually subsided, and she recovered her health. The issues were not healed till the end of May, at which time the swelling of the

knee had subsided, and there was no pain either of the knee or elbow.

CASE XIII.

Elizabeth Knight, 26 years of age, was admitted into St. George's Hospital on the 22d of March, 1815.

For six weeks previous to her admission she had laboured under pain in the left knee unattended by swelling. At the time of her admission there was violent pain in the joint, which was worst during the night, so as to interrupt her sleep.

She was directed to remain in bed, and a caustic issue was made on each side of the patella.

On the 3d of April, the pain had very much abated; and in a few days it entirely left her.

About the middle of April, she was seized with pain of the right knee, (also unattended by swelling), but she made no complaint of it until the 8th of May, when the pain had become more violent. A blister was applied to the right knee, and kept open with savine cerate. The pain was completely relieved in five or six days; but the

blister was continued for a fortnight or three weeks afterwards.

On the 21st of June, having been for several weeks free from all uneasiness, she was discharged from the hospital.

In this and the preceding case more than one joint was affected at the same time, which I have shewn elsewhere to be no unfrequent occurrence*. The next case is one referred to in a former part of this paper, and in which I suppose the original affection to have been ulceration of the cartilages, and that inflammation of the synovial membrane supravened as a secondary disease. The circumstances of the case seem at least to be better explicable on this supposition, than on any other.

CASE XIV.

John Child, 33 years of age, in April 1814 was seized with a pain in one knee. The pain at first was slight, but gradually became very severe: it was referred principally to the head of the tibia on each side of the ligament of the patella. At

* See Pathological Researches respecting the diseases of joints, Medico-Chir. Trans. Vol. IV. In four cases out of ten, which are here recorded, the disease was proved by dissection to co-exist in two or more joints.

the end of five months the joint for the first time became swollen; and the swelling speedily attained a considerable size. He was now under the necessity of confining himself to his room. Five blisters were applied in succession, and the swelling and pain subsided: so that at the end of three weeks he returned to his usual occupations. In five or six days however the pain and the swelling returned, and he was in consequence admitted into St. George's Hospital on the 26th of October.

At this time he complained of pain in the joint, referred to the head of the tibia on each side of the ligament of the patella. The pain was excruciating, so as often to keep him awake a whole night. The knee was much swollen; the swelling arising from an effusion of fluid into its cavity, and having the same form as in the ordinary cases of inflammation of the synovial membrane.

October 29, a blister was applied, including the greater part of the circumference of the joint.

November 7, the swelling and pain were relieved. Another blister was applied, which was kept open with the savine cerate, until the end of the month. It was then healed, and a third blister was applied and kept open in the same manner. On the 21st of December he left the hospital of his own accord. The pain at this time

was very nearly, but not completely, relieved; the knee was swollen only in a very slight degree, and the trifling swelling, which remained, appeared to arise not from fluid within the articulation, but from thickening of the soft parts in consequence of their having been previously inflamed.

CASE

OF

HERNIA VENTRICULI,

FROM

EXTERNAL VIOLENCE,

WHEREIN THE DIAPHRAGM WAS LACERATED WITHOUT FRACTURE OF THE RIBS.

By THOMAS WHEELWRIGHT, Esq.
SURGEON.

COMMUNICATED BY
ASTLEY COOPER, Esq.

Read May 23, 1815.

THE abdominal viscera have been occasionally found protruded into the cavity of the chest. The apertures by which they have passed, have arisen either from original malformation of the diaphragm, or from laceration of that muscle.

In the Medical Observations and Enquiries, an account is given by Dr. Macauley, of a malformation of the left part of the diaphragm, which permitted the passage of a part of the abdominal viscera into the cavity of the chest. In the Medical Records and Researches a similar case is related, in which the hernia had become strangulated, and occasion-

ed the death of a young woman aged 28 years; and in the same work, a case is given by Mr. Bowles, Surgeon, of Bristol, of a hernia through the right portion of the diaphragm, in a man who died at 50 years of age, of excessive vomiting after the administration of an emetic. This hernia was contained in a sac of peritoneum and pleura, which had covered the deficient part of the diaphragm.

Hernia through the diaphragm occasioned by a laceration of that muscle, has occurred from fractures of the ribs. A case of this kind has been dissected by Mr. Travers, at Guy's Hospital: the ribs had been broken in the right side, and the intestines had escaped into the cavity of the chest, where they became strangulated and occasioned the death of the patient.

But no case of protrusion of the abdominal viscera into the chest has occurred within my knowledge, in which a laceration of the diaphragm has arisen from pressure of the abdominal viscera, as happened in the case I shall now proceed to detail, and I have to regret my inability to give the circumstances more minutely, having had some difficulty in obtaining possession of the few facts I have here endeavoured to relate.

Gerard Grout, a native of Lubeck, aged 27, a strong robust man, seaman on board of one of his Majesty's ships, was received into Plymouth Hos-

pital, the 25th of October, 1814, on account of a gun-shot wound in his face; and discharged from thence, cured, and invalided on the 17th of November following.

On his way to London the coach broke down at a place called Hunter's Lodge, about three o'clock in the morning of the 20th inst. and he being an outside passenger, was projected to some distance, and fell with considerable force. He did not however appear to be materially hurt, nor did he complain either at the time of the accident, or at any subsequent part of the journey. It is to be observed, he was intoxicated at the time he sustained the fall; about noon he proceeded on his way to town; and with one or two other persons who had been hurt, rode as inside passengers; but he seldom spoke, and never complained of pain, nor did he appear to the other passengers to suffer much in the course of his journey. On his arrival in London, which was in the evening of the 21st inst. he first complained of sickness, and said he was very ill; and soon after was conveyed in a hackney-coach, together with a black sailor also much hurt, to St. Thomas's Hospital, and walked from the coach to the dresser's room without assistance. Mr. Edward Tothill, dresser for the week, an intelligent young man, informed me that he complained much of pain in his left side, sickness, and shortness of breathing. His side was carefully examined, and his ribs not being fractured, or any

other bone broken, he was sent back to the inn; his pulse being strong and full, sixteen ounces of blood were previously taken from his arm.

At 10 o'clock the following morning, I was desired to see him, and found him under great suffering. He complained of most severe pain in his left side, great difficulty of breathing, violent and continued vomiting, chiefly of blood. Pulse 120, small, tremulous, and irregular; countenance pallid; extremities cold; and temperature of the whole surface of the body below the natural standard.

By assistance he was raised in the bed, and upon desiring him to cough, he was unable; as the mere attempt to expand the chest gave him excruciating pain. I satisfied myself, however, the ribs were not fractured.

By the violent efforts of retching, the bandage had slipt off his arm in the course of the night; and a considerable quantity of blood had flowed from the orifice, about the room and bed-clothes: in addition to which he had vomited from two to three pints of bloody fluid. From these circumstances I entertained little doubt but that some internal viscus had given way from the fall, and that he was sinking from internal bleeding. I merely directed some aperient medicine, which his stomach rejected immediately; and a liniment for his side. He expired the same evening, about 11 o'clock, and the

following morning I obtained permission to examine the body.

Dissection.

On removing the parietes of the abdomen, the viscera were observed to be but little altered from their natural position, and contrary to my expectation, no blood was extravasated into its cavity. The pyloric extremity of the stomach was confined in an unusual way, and its coats somewhat inflamed. The other viscera were in a healthy state. On turning back the sternum, a considerable quantity of blood was found in the left cavity of the chest; which amounted by measure to three pints and two ounces. By introducing the hand, a substance appeared attached to the diaphragm, which gave the feeling of a torn portion of lung; but upon more minute inspection it was found to be a considerable part of the large curvature of the stomach, protruded through a fissure of the diaphragm, and filled with a sort of half coagulated blood. The lung of the same side was much smaller than natural, and occupied the upper and posterior part of the chest, and was strongly adherent in its whole surface: as was also the case with the right lung. These adhesions were evidently of long standing. Their substance did not appear to have suffered in any proportion with their membranous covering. The heart was of its natural size, and appeared perfectly healthy.

I was still unable to account from what vessel, or set of vessels, so large a quantity of blood had issued; but upon removal of the whole from the body, a small semicircular aperture was observed at the lower part of the thoracic, or strangulated portion of the stomach; through which the blood had slowly escaped into the cavity of the chest, and thus the very gradual increase of difficulty in breathing was accounted for, which a few hours previous to his death was so exceedingly distressing. I may further observe, that the fissure in the diaphragm was in the direction from below upwards about an inch in extent, and inclining towards the left side. The stricture was so complete, as with difficulty to allow the points of the little finger to pass. The lower or abdominal portion of the stomach was perfectly empty, as were the intestines generally.

The preparation is in the possession of Mr. Cooper. I have thus endeavoured faithfully to delineate the appearances, and may be allowed to make one or two observations in conclusion.

The apparently slight suffering of the man during the first twenty-four hours after the accident, seems extraordinary; when we consider the importance of the injured organs, and, that the period of approach of the symptoms of strangulation should have been so long delayed, is not less surprising; particularly under the circumstances of travelling in a carriage

a distance of not less than 145 miles. At what time these symptoms began I cannot precisely state; but he first complained of pain on his arrival in London, and the vomiting of blood commenced about twelve or one o'clock of the morning previous to his dissolution.

Wood Street,
January 29, 1815.

SKETCH

OF THE

MEDICAL HISTORY

OF THE

BRITISH ARMIES

IN THE

PENINSULA OF SPAIN AND PORTUGAL,

DURING

THE LATE CAMPAIGNS.

By SIR JAMES MACGRIGOR, M.D. F.R.S. Ed.

VICE-PRESIDENT OF THE MEDICAL AND CHIRURGICAL SOCIETY;
LATE INSPECTOR OF HOSPITALS TO THE ARMY UNDER THE DUKE OF WELLINGTON;
AND DIRECTOR OF THE ARMY MEDICAL BOARD.

Read June 20, 1815.

IT has fallen to my lot to superintend the Medical Department of the Army on the two greatest services on which the military force of this country has of late years been employed, namely that in Walcheren and that in the Peninsula. Before the memory of the fleeting events shall have been obliterated from my mind, I purpose submitting to this Society some statement of the service on

which I was last employed. I shall at present offer a short sketch of the medical history of the memorable campaigns in the Peninsula. Perhaps circumstances may prevent my ever being able to fill it up.

I shall arrange what I have to offer under three heads. In the first I shall give a short sketch of the medical history; in the second, some remarks upon the diseases which prevailed; and in the third, an account of the chief means by which sickness was diminished in the army, and mortality in the hospitals.

I proceeded to the Peninsula, and assumed the medical superintendence of the army from December 1811, and remained till June 1814, when the army was finally broken up at Bourdeaux.

For the sake of order I shall divide the history of the peninsular service into four periods.

The first of these commenced in December 1811, when Lord Wellington opened the campaign with the siege of Ciudad Rodrigo, passed over into Estremadura, and took the strong fortress of Badajos by assault. Having thus laid open the passage into Spain by seizing on its two strongest bulwarks on the Portuguese frontier, the campaign closed, the army going into cantonments at the end of April.

The second campaign began by the army advancing into Spain in June 1812, and fighting the memorable battle of Salamanca which opened to us the road to the capital, cleared Cadiz and the whole south of Spain of the enemy, and, perhaps, ultimately led to the liberation of Europe. Circumstances finally occasioned our retreat from Spain and wintering in Portugal, whither we moved in November 1812.

During this period, the army remained in cantonments refitting and recruiting till May 1813, when it took the field again, advanced into Spain, and, after a series of actions and a service of the most brilliant achievements, fought the great battles of Victoria and Pampeluna, stormed the fortress of St. Sebastian, and planted the British standard in France, where we remained in quarters during the ensuing winter.

In the fourth period, the army in February 1814 advanced into France and we continued advancing and fighting till May 1814, when accounts of the peace reached us, and hostilities were terminated.

To commence with the first period: the campaign opened in the north of Portugal, during a very inclement season and with very little shelter or cover. The harassing duties and severe weather, which we experienced, were causes of sickness to the divisions of the army employed at the siege

of Ciudad Rodrigo. Snow fell occasionally, and in December, January, and February, the ground was usually covered with hoar-frost. The sick and wounded, French and Portuguese as well as British, were moved to Castanheira, Celorico, and ultimately to Coimbra, a distance of more than forty leagues from Ciudad Rodrigo. The number of wounded was very considerable; a great many of them arrived with the extremities frost-bitten; and Tetanus was not unfrequent. At this period, contagious Typhus was prevalent in the hospitals at Castanheira, Celorico, and Coimbra.

In February, almost the whole army was rapidly moved to the southern frontier of Portugal, and joined Lord Hill's corps which had been for some time employed in watching Marshal Soult's movements in this quarter. The siege of Badajos immediately commenced: it rained heavily during the whole of the siege, which, with the severity of the duties, and some intemperance, induced a good deal of disease. The number of the wounded in the hospitals exceeded five thousand.

When the attack on Badajos and the march to Estremadura were determined upon, Dr. Dickson the Purveyor General formed a line of hospitals from Badajos to Lisbon, viz. at Elvas, Estremos, Alter de Chaô, Abrantes and Santarem; and after the fall of Badajos all of them were speedily filled with sick and wounded.

It appears by the returns transmitted to me from the divisions of the army during this period, that the diseases prevailing were continued fever, (which at the first part of the season called for the free use of the lancet,) Pneumonia, Catarrh, Vernal Intermittents, Cynanche and Rheumatism. Locked Jaw was likewise not unfrequent among the wounded.

2nd Period. From June, when we took the field, till November, when we retreated from Madrid and Burgos, the army was most actively employed; we traversed a great part of Spain; the soldiers exposed to a burning sun in the day, and generally sleeping in the open air at night. From June till September, the degree of heat was considerable; in August, it was seldom under 90 degrees of Fahrenheit's thermometer; the rains commenced in September, continued very heavy in October, and the greatest part of November, when the severely cold weather mentioned as prevailing in Portugal in December last year, was every where felt by the army on their entering the barren mountainous frontier of Portugal.

In the beginning of the campaign, and in our progress when advancing, we established hospitals at Salamanca, Segovia, Medina, Madrid, Valladolid, and Burgos; and for Lord Hill's corps, in a line from Madrid to Badajos, by Toledo, Truxillo, and Talavera. When the army commenced its

retreat in October, all these hospitals were broken up, and the sick thrown on Ciudad Rodrigo, Celorico, Coimbra, and also Viseu, which was now formed into an hospital station.

From the long line of communication, and the great distance from which sick came under circumstances the most unfavourable, many of them in the advanced stages of disease, a heavy mortality occurred in these hospitals, particularly in the month of November.

The diseases of this period were chiefly remittent and continued fever. Under the many unfortunate circumstances which occurred in November, this assumed the typhoid shape. In the parts of Spain and Portugal where remittent and intermittent fever are endemic, the sickly season is from July to September. After the rains had set in in September, dysentery, the scourge of armies, appeared in our hospitals; and other diseases were observed to have a great tendency to terminate in this the most fatal of all. In October, phagedenic ulcer or hospital gangrene, as it is termed, spread widely among the wounded. Tetanus was prevalent in August, after the battle of Salamanca, and some cases of it appeared at the siege of Burgos. It was very remarkable, how unkindly and severely the rainy weather in October operated on many debilitated cases whose constitutions had been worn out by repeated attacks of fever, joined with bowel

complaints; many of these were suddenly carried off; several in the course of a few hours.

3d Period. When we reached the Agueda and Coa, the army took up positions behind these rivers, and the enemy did not seem inclined to follow us further; it was therefore put into cantonments, and the widely scattered sick collected into hospitals. Many suffered from the extreme severity of the weather, by the transport over bad roads, in bullock cars, or on the backs of mules; but more from their own irregularities. The reports of the enormities and excesses committed by them were dreadful: and numbers of stragglers were discovered dead in different parts. As soon as the army halted, Lord Wellington issued the strictest orders, and every thing was done to re-clothe the men; to provide them with blankets, to procure an abundance of good provisions, and to restore order and discipline. Various instructions were at the same time issued by me through the medical department, touching the health of the soldiers; and contagion being so much to be dreaded under existing circumstances, the most energetic means were taken to prevent its appearance, and to stop the progress of it, when it did appear.

In its cantonments the army was widely spread in villages over a great extent of country. As these villages were mostly dilapidated, or in a ruinous state, the soldiers every where set about re-

pairing them, building fire-places, and rendering the habitations comfortable. The medical officers of each regiment were directed not only to see that the utmost cleanliness and ventilation were preserved in the quarters of their own corps, but to have an eye to the health of the inhabitants, and to report if the magistrates did not pay a proper attention to the police. But above all things, care was taken, that the large body of sick which now oppressed the army, should not be crowded into the general hospitals, where there was already much contagious disease.

With this view every regiment fitted up an hospital for itself, where not only all the sick that occurred were treated by their own medical officers; but the chronic cases were sent from the general hospitals to the regimental, and strict orders were given, that no sick should be sent to the general hospital. The consequence of this measure was, that though contagious typhus and hospital gangrene were in November as prevalent in every corps as they had been in the retreat to Corunna in 1809; these destructive diseases soon disappeared in every regiment, the guards and a few others excepted; and in four months' time, the army was effective and in perfect condition to take the field again.

So completely had the guards been rendered ineffective by the fever which in November pre-

vailed in the army, that three months after, Mr. Nixon informed me, he had not to that time seen any individual fairly recovered from it. The brigade of guards suffered so much, even to so late a period as the end of February, that at my recommendation, they were sent to Oporto; and did not subsequently join the army till after the battle of Vittoria, in June.

The 6th was the most unhealthy division of the army, it contained the 82d and 91st regiments newly arrived from England.

In the bleak cantonments of the 6th and 7th divisions of the army under the ridge of the Sierra de Estrella, almost always covered with snow and exposed to sharp winds, the inflammatory diathesis was prevalent, and was strongly marked in all those who were attacked with disease.

In the more sheltered quarters of the 3d, 4th and 5th divisions of the army, cantoned in the line of the Douro, or in the valley of the Mondego, disease appeared with milder features, and phlegmasia was less frequent. After the 4th division had got settled in their quarters, Mr. Boutflower reports, that not a single instance of typhus occurred. Indeed in every corps of the army, the guards, 11th dragoons, 5th, 45th, 38th, 82d, 87th and 91st regiments excepted, the fever which appeared a month

after they came into cantonments was universally synochus.

The weather was very severe during the end of November, the whole of December, January and part of February. In January, even at Lisbon, the thermometer stood at 42° in the shade; and in these months the admissions into the hospitals were cases of pneumonia, with low fever, continued fever, catarrh, and rheumatism of the feet. In February, the thermometer at Santarem stood at 45°, and the wind was often at north-east. In April, the weather was warm after some rain, the beginning of May was very cold, but after this it rained a good deal; then the thermometer rose very high, and about the end of May the number of intermittents considerably exceeded that of any other disease. We approached the mountainous frontier of France in this month, and had a good deal of rain.

In August, so healthy had the army become after a little rest in this month, and so mild and trifling were the diseases of the soldiers which now made their appearance, that it was found difficult to reduce them to distinct heads. Such an exemption from disease, in one of the most unhealthy months in the year in Spain, we attributed solely to the healthful bracing air of the mountainous encampments, at a distance from villages. Much must likewise be attributed to the moderate and

wholesome portion of labour, which the troops now had in fortifying the passes; to the abundance, and good quality of the provisions; very much to the soldiers being excluded from the temptations to drunkenness and disorder, which too irresistibly offer themselves to them when quartered in towns and villages: and somewhat I think is to be attributed to the exhilarating view, which from the lofty Pyrenees we had of the plains of France, and the hopes which all entertained of fighting on the very ground on which the Black Prince led a victorious English army so many years before. Different indeed was the termination of this campaign from that of the former.

In the first part of this period, there was much severe disease, and great mortality on the line of the general hospitals to which the sick had been sent during the retreat, viz. Ciudad Rodrigo, Celorico, Coimbra, and Viseu.

When the army was preparing to advance, we constructed buildings, and fitted up part of a neighbouring village as an hospital, in a healthy situation near Castel Rodriguez, and contiguous to the Douro; by which sick could be conveyed from it to Oporto, where we likewise formed a large hospital establishment. It was intended, as we advanced, to have sent back all the sick and wounded as they occurred to this hospital, near Castel Rodriguez: fortunately however, the advance of the

army was so rapid, as to admit of this being done but in a small degree.

We established hospitals in succession, at Miranda de Douro, Zamora, Toro, Placentia, Salamanca, Valladolid, Vittoria, Vera, and along the north coast of Spain at Corunna, St. Andero, Bilboa, Passages, and St. Jean de Luz.

In the early part of this period, pulmonic affection supervened on intermittents; and in many instances, pulmonic affections were combined with agues and fluxes. The prevailing disease finally assumed the form of low fever.

The dysenteries which had been conveyed a long way to the general hospitals in November, arrived in the most unfavourable state, and little was left for the practitioner to do. Every case presented a complication of disease, disorganization of the viscera, and, in most cases, an irrecoverable loss of tone in all the vital powers.

In November, the febrile disease had been verging from the autumnal remittent to the winter continued type. It was not till February had nearly closed, that the malignity of the fever which had prevailed in general hospital stations began to abate.

Hospital gangrene was very prevalent in some

of the regimental as well as in the general hospitals, after the retreat. After the battles of Vittoria and Pampeluna, it spread widely; and committed great havock in the hospitals at Vittoria, Bilboa, St. Andero, and Passages.

Tetanus was more prevalent after the battles of Vittoria and Pampeluna, than had hitherto been seen in the Peninsula.

As the campaign consisted of a series of actions, besides the great battles of Vittoria and Pampeluna, and the siege of St. Sebastian, our number of wounded was very considerable. Vittoria, Bilboa, and St. Andero were much crowded, not only with the British, but with the French, Portuguese, and Spanish wounded.

The fever which prevailed during the campaign was the continued and remittent, which prevailed during the campaign of last year, but it was this year of much milder features.

4th or last period. The healthy state in which the army came into winter quarters in the beginning of November, continued with most of them, throughout the winter, although there existed not a few unfavourable circumstances. Never perhaps did an army undergo more fatigue than this did during the last campaign. When not engaged with the enemy, they were performing long and harassing marches

during the day, and usually slept in the open air at night.

At the beginning of this period, the army was posted on one ridge of the Pyrenees, the southern, the enemy being posted upon the opposite, and they did not permit us to remain in quiet quarters during the winter. Some of the men were in tents, some in huts slightly constructed, and others under sheds, or in the dilapidated villages which the enemy had destroyed.

The weather in November, December, and January was severe; part of the mountains being deeply covered with snow; and whether it rained or snowed, the situation of the soldier was extremely unpleasant; even the Scotch Highlander felt severely the rigour of this Alpine situation.

The diseases which prevailed were synocha, pneumonia, catarrh, and rheumatism. But few men were lost, the diseases being attacked in the early stage, in the regimental hospitals, which were established in the neighbouring villages, and very few men being sent to the rear. What I have never before seen, occurred at this time; the cavalry was the only sickly part of the army. Though there was most disease in the household brigade, 10th and 15th hussars, who all of them arrived last season from England; yet no regiment of cavalry was very healthy at this time. In order that they

might have forage, the cavalry was cantoned in the richest part of Navarre, on the banks of the Ebro, where the quarters were good, there being many large villages and towns which however provided liberally the causes of disease to the soldier. At first, there prevailed synochus, diarrhœa, cholera, and catarrh; latterly, typhus, pneumonia typhoidæa, and dysentery. There was a good deal of intermittent fever in every part of the army, excited most probably by the cold in those who had had agues in the former season.

The few sick who were sent to the rear from the divisions of the army, were sent to Passages; whither likewise, the wounded at St. Sebastian's were sent in the first instance. From Passages, the sick and wounded were sent occasionally by sea to Bilboa and St. Andero. As transports are but ill accommodated for the conveyance of wounded men, or those labouring under dysentery or fever, and as the season was very unfavourable on the north and east coast of Spain, they often suffered a good deal on the passage; hospital gangrene spread; cases embarked as synochus, landedas typhus, and some assumed the appearance of typhus icterodes. The few cases of this last disease, which appeared at St. Andero, by no means justified the alarm which the Spanish government took, in subjugating our hospitals to the rigours and inconveniences of the quarantine laws.

After synochus, the disease next in frequency, throughout the army, was dysentery; but when it was attended to in the very first attack, in the regimental hospitals, and when in its pure unmixed form, the lancet was freely used, there was very little mortality from it.

Though in quarters, we came frequently in contact with the enemy, and had a considerable number of wounded, particularly in January, when the 1st and 5th divisions gradually advanced upon the enemy, till we came close on Bayonne.

Early in December, by Marshal Soult's attempt to force the 2d division of the army, we had 1100 men of that division, a good many prisoners, and a considerable number of Portuguese wounded; and an hospital was established for them by Dr. Tice, in the miserable village of Cambo, where the action was fought. Immediately after this, we successively forced the enemy across the Nivelle, the Nieve, and about the end of February, the large river Adour; when the campaign might be said to have fairly opened, the combined army entering France. About this time, the division of the army which had served in Catalonia joined us. Mr. Brown, who superintended the medical department, reported to me, that that part which had come from Sicily to Alicant, was very healthy, the proportion of sick to those in health being as 1 to

25. One of the Italian regiments brought with them 75 cases of ophthalmia, which disease, Mr. Brown states, he found to be epidemic on the east coast of Spain.

Sir James Fellowes made me the same favourable report of the state of the small division of the army which was left at Cadiz. Part of this division had joined us in the second campaign, and part had been sent to Carthagena, where General Ross commanded. Dr. Wright, General Ross, and many officers and men were lost by the same contagious fever which had made such havock at Gibraltar, Cadiz, and most places on the coast of Spain.

The 1st and 5th divisions under Lord Nidry, being left to blockade Bayonne, the Duke of Wellington proceeded with the other seven divisions into France. After fighting the battle of Orthes, we met with no resistance to our progress, till we came to Toulouse, the capture of which became the fruit of the victory gained under its walls. The accounts of peace which we heard in April arrested our further victorious progress. The climate and season of the last campaign were favourable, and we suffered very little from disease, our hospitals containing few besides the wounded.

PART II.

Of the Diseases which prevailed.

On reference to the returns of the sick and wounded, I find, that from the 21st of December, 1811, to the 24th of June, 1814, 346,108 cases of disease or wounds were treated in our hospitals. There appeared to have been discharged cured from the hospitals, during this period, 232,553. There were invalided, as no longer fit for active service in the field, or sent to England for the recovery of their health, 4,586; and there died of their wounds or of disease 18,513. This mortality, enormous as the number may appear at first sight, will not be thought great upon due consideration, and an explanation of attendant circumstances. The above number includes the death of every wounded man, who had been received into the first hospital establishments, or had been seen by a surgeon, and it consequently includes many hundreds who did not live one hour after they were seen. This is a description of cases which has not usually been brought forward in any returns, military or medical; it being the custom in almost all armies, to include under the head killed, all those who die within a few hours after an action.

If the circumstances under which we acted be duly weighed, the mortality from disease in the

Peninsular army will appear very small. I have reason to believe, that the practice in our general hospitals was on the whole at least as successful, as it hitherto has been in any military hospitals. The first part of this paper will shew some of the disadvantages under which the practitioner in the general hospital received the greater part of his patients. They consisted of dysentery usually complicated with disorganization of the viscera, and this, as well as fever, pneumonia, hospital gangrene, and other diseases were mostly received in their advanced stages. I believe that the British army never possessed so great a proportion of high professional talent, and never more ardent zeal in the discharge of duty, than were displayed by the physicians and surgeons in the general hospitals in the Peninsula.

I mean to offer some remarks on the diseases which were most prevalent, and I commence with fever, which was the disease of by far the most frequent occurrence. This is a subject on which very much has been written, and on which there has been great discordance of opinion from the very earliest ages. Fever was with us of many and various types; not only different in the different seasons, and in the different quarters of the Peninsula which we traversed, but it had an infinite number of shades even in the same place, and even when it attacked subjects who appeared to have been similarly circumstanced. In the returns of sick

transmitted to me, I have not unfrequently observed some cases stated as remittents, when probably, the only reason for denominating them so, was the strongly marked exacerbation of continued fever; while another practitioner with the same cases would have denominated them differently. I found that many felt a difficulty in drawing an accurate line of distinction, which it must be confessed is not a little arbitrary; particularly when the forms of disease so frequently passed into each other as they did in the Peninsula.

Not only had fevers very different forms in different seasons, and in different quarters of the same season; but they required very different, nay opposite kinds of practice; the knowledge of this strongly impresses on us the necessity of becoming acquainted with every attending circumstance, before we venture to censure any particular practice.

A case occurred to Dr. Emerson at Celorico, in January, 1812, which had commenced as continued fever, became remittent, then intermittent, and then again continued fever, from which the patient ultimately recovered.

The following is the order of frequency in which fever occurred: 1st, continued, usually the synochus of Cullen; 2ndly, intermittent; 3rdly, remittent; 4thly, typhus. The latter is a type of fever which has become of much less frequent occur-

rence in the army than it was, it is even a more rare disease now than is generally supposed. I have very often seen the disease erroneously denominated typhus, when it has been merely marked by the debility succeeding the stage of reaction, in either synocha or synochus; and this is of more importance, than as regards a mere nosological distinction; for it leads to a material difference in practice.

I shall begin by adverting to fever, as it appeared from November, 1812, to the autumn of the following campaign. It was every where at first synochus or remittent fever, but in the course of a little time, in most corps it assumed the typhoid appearance, and in a few, proved a most formidable and fatal disease. Several of our regiments had been in the army of Sir John Moore, and the surgeons reported to me, that the appearances which the cases of fever assumed with us in the months of November and December, were precisely the same as those which they had seen in the retreat to Corunna, and I well remembered the same appearances when that army landed in England. When I visited the hospitals in January, the great similarity of the disease which I then saw, to that which I had seen at Portsmouth in 1809, struck me forcibly; the greater part of the sick of that gallant but ill-fated army, having been brought to hospitals in the vicinity of Portsmouth, under my superintendence.

By the time the sick sent to the rear in October, November, and December, reached the general hospitals at Ciudad Rodrigo, Celorico, Viseu, or Coimbra; the cases appeared in the most malignant form which typhus has ever assumed.

The disease appeared in different shades, in the different divisions of the army, but with most malignity in the 1st division, in which the guards were; and in the mildest form, in the light division of the army.

The causes are apparent in the history of this period, namely, the 3d. In the Medical History of armies as well as fleets, it will, I believe, be invariably found, that troops coming into cantonments after an active campaign, even under favorable circumstances, have very rarely, if ever, been found healthy. It is not improbable, that the powerful stimuli, mental and corporeal, which have been applied during an active campaign in the field, induces such a degree of exhaustion as either to predispose to disease, or diminish the resistance to morbid actions. These causes would act with redoubled force, when the troops arrived under debility of body and depression of mind; exposed to great fatigue, watching, want of food, cold and wet, with the depression which always accompanies a retrograde movement. Almost every corps suffered from want of clothing, blankets, watch-coats, shoes and stockings. In this com-

fortless state, and in the midst of a severe winter, the divisions of the army arrived in the miserable ruined villages assigned to them as cantonments. The remains of the inhabitants of these villages, who were extremely poor, suffered much themselves from want of food and from cold; they were in general sickly, low fever prevailing among them. In the 6th and in the 7th divisions the men were unfortunately at first very much crowded in their cantonments; but this was soon remedied; and in these as well as in all the other divisions of the army, the orders of Lord Wellington were promptly obeyed, the cantonments were soon rendered comfortable, the soldiers got clothing and blankets, and above all, they were regularly supplied with abundance of wholesome provisions by the commissariat.

Throughout the divisions of the army it was observed, that those regiments which suffered most, were those who had served in Walcheren; next, those who had come lately to the Peninsula. In the regiments which had served some time in the Peninsula, the first subjects of attack were recruits or those who had last joined; next, the convalescents from the general hospitals, and who had frequently marched a considerable distance to join their regiments.

As I have already said, the divisions which suf-

fered most were the first and sixth; in the first, the disease was confined almost entirely to the guards; the German regiments of that division being among the most healthy corps of the army, as I have uniformly seen them on every service, particularly in Walcheren. Of seven regiments, which composed the sixth division, six had been in Walcheren. The most unhealthy regiment in this division, and the one which, next to the guards, suffered the greatest mortality in the army, was the 91st Highlanders. This regiment had been in Walcheren, where I observed it to suffer more than almost any other of the sickly corps on that service; but it was the latest arrived in the Peninsula. It had hardly recovered from the effects of this fever, and become effective, when we left the Peninsula. On my inspecting the hospitals in January 1814, before we marched into France, I observed the men still retain a sallow and unhealthy look; and their sick list was greater than that of any other in the army. I find from the 7th October 1812, when this regiment joined the army, to the 24th May 1814, they lost not fewer than 220 men and had 56 invalided; and this from a strength of 952 men on their landing with 121 recruits received in that time, a total of 1703.

When the army halted in quarters, it was remarked as a peculiarity in the prevailing fever, that there was extreme pain in the lower extremities, without swelling or redness, and this often remain-

ed after the febrile action had ceased. The disease was in many cases slight, and of no long duration; but relapse was extremely frequent, till the clothing of the men was mended, and till the carpenters and artificers had repaired the buildings assigned to us as quarters and hospitals. Lumbrici were frequently voided by the mouth at this time.

Staff-surgeon Cole states, that in the 6th division, the attack of the disease was sudden and unexpected without much preceding lassitude or indisposition. Violent headache, immediate loss of power of the lower extremities, attended with violent pains of the muscles and joints, without redness or tumefaction, bilious vomiting and occasional purging, a peculiar wan visage or sallow aspect with glassiness of the eyes; these were the appearances which marked the first attack. The pulse then became quick, weak, and often intermitting, the temperature of the body was seldom above the natural standard, and the tongue was always very foul. On a remission of the febrile symptoms, or approach to convalescence, the patient experienced excruciating pains of the lower limbs, especially at night, which greatly retarded recovery. In many instances, deafness, vacancy of aspect and stupidity continued long after the removal of the febrile affection. When death occurred, the patient sunk very rapidly, and was usually carried off by a diarrhœa which resisted every remedy. Mr. Scott, surgeon of the 11th

regiment, states, that in two of his cases, he saw light coloured petechiæ, and in two more, a remarkable frightful appearance of the face with tumefaction and lividity of the nose and upper lip.

But it was in the brigade of guards, that this disease appeared in its severest form: and of them, the regiment which suffered by far the most, was the 1st battalion of the 1st regiment. Along with the 91st regiment it landed at Corunna in September 1812, and from that time to the 24th May 1814, it suffered the enormous loss of 674 men dead in hospital, besides 280 who were invalided from a strength of 1400 men on landing and an addition of 565 recruits received thereafter, making a total of 1965 men; it suffered the greater part of this loss immediately after the retreat, and became very healthy long before it embarked for England. Mr. Bacot, the surgeon of this battalion, informed me, that on landing at Corunna, he only left 63 men there who were unable to march, and the battalion joined the army on the retreat at Duenos with only 58 sick of all descriptions, though they had made long marches in severe weather over the mountains of Gallicia. When I saw this battalion at Duenos, in appearance they were by far the finest and most complete in the army, exciting the admiration of every officer who saw them; never surely was the appearance of men more altered than was that of this unfortunate battalion when I visited their hospitals near

Viseu in January. Mr. Nixon, the deputy inspector of hospitals of the guards, informed me, that by the time they reached Salamanca much diarrhœa and fever appeared in this, as well as in the other battalions of the guards. The sickness continued greatly to increase from the time they left Salamanca, perhaps about the 20th October till their arrival near Celorico on the 4th December. They sent in this period to the different general hospital stations something more than - 300
Of these died in general hospitals - - 140
There remained in these general hospitals 60
There joined the 3rd battalion from general hospitals - - - - - - - 100
but of this number, almost all relapsed and there died - - - - - - - 40
in their own regimental hospitals. This is indeed a sorry account of 300 men, and is only equalled by one instance that came under my own observation in the West-Indies. It was that of the 56th regiment which had sailed from Cork for St. Domingo; but after having been a long time at sea, the transports put into Barbadoes in 1796, typhus icterodes prevailing with more malignancy, and being attended with greater mortality, than I have ever seen.

Mr. Bacot states, that in the latter part of the retreat, cases of affection of the chest were very prevalent. When the battalion halted, the cases which he admitted into hospitals were those of complete exhaustion; without any prominent

symptom of disease, without local pain, heat or fever, or derangement of the bowels; the men simply complained of want of power to move their limbs; they died without being roused in the least by any stimulant; though they were largely, but cautiously and gradually exhibited. Great part of them proved fatal. Dissection made no approach to a discovery of the causes of the disease.

Mr. Nixon, in speaking of the sick of the three regiments of the guards, on the first invasion of this disease, says, that in almost every instance, the skin was below the natural temperature, and continued so during the whole progress of the disease. The head though at first affected with pain and giddiness, did not in general become very much confused; nor was the delirium which was met with in some of the cases, either of long duration, or of considerable extent; on the contrary, the intellect was perfectly clear to the last period of life. The deep yellow tinge of the skin was a very common occurrence in the 1st regiment, not so frequent in the Coldstream, and very rare in the 3d regiment of guards. All this description of patients died, with one exception. The vomiting of large worms was very general; several of those who died with yellowness, were opened; but no disease discovered either of the liver, gall-bladder, or ducts. Few of the serjeants, orderlies or nurses attending on the sick, escaped an attack of the disease. It appeared to me, that the prominent feature in the

disease was the very low temperature of the skin, and the total want of every thing like reaction. There was in general so much affection of the alimentary canal, as to forbid the use of the cold affusion, or the treatment by purgatives, as recommended by Dr. Hamilton; indeed it was reported to me that, in some cases where this last treatment was tried, it did harm.

i.

In January 1812, fever made great havock in all the general hospitals. At Ciudad Rodrigo, Dr. Neale informed me that the cases of typhus had almost universally mortification of the lower extremity, with livor, and mortification of the nose. This contagious fever soon seized on all the ward-masters, nurses, and orderlies, and, Dr. Neale himself excepted, upon every one of the medical officers attending the hospital. If my recollection serves me, not less than eleven of our medical officers died there. Rheumatic, catarrhal, and even peripneumonic symptoms ushered in the commencement of the fever, at Ciudad Rodrigo. Dr. Neale sometimes resolved the fever by sudorifics; but the convalescence frequently terminated in incurable diarrhœa. He sometimes successfully gave the Peruvian bark largely, sometimes combined with camphor, aromatics and opium; and assisted them by the warm bath, blisters, and sinapisms. He informed me, that the mortality among the inhabitants had been enormous: in 12 months, 1200 out of a population of 6000, died of misery and fever.

Drs. Emerson and Bone give a similar account of the hospitals at Celorico, the next place to which the sick were sent in Portugal; and the statements of Drs. Tice, Moseley, and Erly, of the appearance of such cases as reached Coimbra, are to the same effect.

But it was at Viseu, that most of the disease was seen. The fever in the hospitals at Viseu was evidently rendered virulent by the admission of the sick of the guards, and attended, as Dr. C. Forbes says, with a mortality which he had seldom seen equalled in the West-Indies, in its most sickly times.

In the beginning of February, the brigade of guards emptied the whole of their hospitals, and sent every case to the general hospital at Viseu. At this time the fever was peculiarly characterized by a strong tendency to dissolution of the body, exemplified in extreme debility, the very frequent occurrence of deadly cold in the extremities, and, in many instances, of all parts of the body excepting those nearest the sources of the circulation. Petechiæ and vibices were almost constant symptoms, as likewise gangrene of the feet; in some instances, of the hands, and in some, of the feet, hands, nose, and ears.

The invasion of this most formidable fever, was very characteristic of its type. In as far as I could

learn, during my visit to Viseu, and from the correspondence of Drs. C. Forbes and L'Affan and Mr. Nixon, it made its advances by very slow degrees, the person affected for some days complaining of great diminution of vigour, both of body and mind, without being able to explain precisely what ailed him. Many continued several days in this state, generally with very great depression of spirits. Mr. Nixon told me, that, frequently, a soldier of the most athletic make, and with no appearance of disease, expressed himself as ready to cry without knowing the reason. After remaining a few days in this state, prostration of strength would very rapidly come on; and in several instances to such a degree, that they fell down, and every attempt to restore action has failed. Reaction in this fever seldom took place.

It was remarked, that a majority of cases were unattended with delirium, even to a very short period before death. Towards evening, sometimes when the agency of external stimuli was withdrawn or nearly so, and had little influence on the senses, some tendency to delirium has taken place; but for the most part, this went off in the morning.

Yellowness of the skin was not an unfrequent symptom, and it was observed, that patients so affected seldom recovered. Dr. Forbes could only recollect two recoveries in this state, of all the pa-

tients sent to Viseu. In one case that died jaundiced, and when the body was opened, the gall-bladder was distended with bile; but there was none in the duodenum, which was distended with air. The yellowness of the skin appears in this case, therefore, to have arisen from absorption of bile in the constitution, perhaps owing to an obstruction in the common duct spasmodically affected.

In a milder variety of this fever, and as it appeared latterly, there was remarked invariably an affection of the head, with a dull headache, excessive torpor of the bowels, much general irritability, combining stupor with watchfulness, and great mental depression. In these cases the head was shaved, and leeches were applied to the temples; sometimes the temporal artery was opened, and the whole scalp was covered with a blister; but when the symptoms were milder, the blister was applied to the nape of the neck. At the same time a brisk cathartic was exhibited and repeated if it did not speedily act.

Besides these remedies, the body was sponged with vinegar more or less according to the degree of animal heat existing, and to this, and the increase of temperature, the special attention of the nurses and orderlies was particularly called in all cases. The saline mixture, with a proportion of tartarized

antimony, given in repeated doses, was serviceable in many cases. Wine was given according to symptoms, but never in large quantities.

I find that in the regimental hospitals, the state of admission of cases of continued fever is as follows:

In 1812 - - - -	16,923
1813 - - - -	18,294
1814 to the 24th of June, -	5,007

The total deaths in all the hospitals, general as well as regimental, of continued fever, was in

1812 - - - - -	2,020
1813 - - - - -	1,598
1814 to the 24th of June, -	387

Of typhus, we admitted in the regimental hospitals in

1812 - - -	331
1813 - - -	1,309
1814 to the 24th of June,	155

In 1812, there died in all the hospitals, general as well as regimental - - - 999

1813 - - - - -	971
1814 to the 24th of June, -	307

Remittent Fever.

Of this disease, there appeared in the regimental hospitals in 1812 - - 1,826
1813 - - - 1,699
1814 to the 24th of June, 436

There died in all the hospitals, general and regimental, in 1812 - - - 67
1813 - - - 65
1814 to the 24th of June, 18

I have nothing to offer either on the appearance of remittent fever, or on its treatment. The cold affusion was reported to have been frequently useful on the accession of paroxysms, in the beginning of the disease. In the early stage of pure unmixed remittent, the use of the lancet was indispensable; and when the disease was of long standing, the aid of mercury was called in.

Intermittent Fever.

Of this disease, I find, that we admitted altogether 22,914 cases in the regimental hospitals, and as follows:

In 1812 - - - - 13,759
1813 - - - - 8,203
1814 to the 24th of June, 952

A retrospect of the first part of this paper will explain, why so much of this disease fell on 1812. Almost the whole of the army passed over this year into the Alentejo, and Estremadura, the soil of which is at all times so fertile of this disease; indeed, there are not many parts of Portugal where it is not endemic. It is particularly so about Elvas, Badajos, along the sluggish banks of the Guadiana, in the line of our hospitals, at Alta de Chaô, and on the banks of the Tagus, at Abrantes, and Santerem. So common is ague in many parts of Spain and Portugal, that the inhabitants do not term it a disease; infants at the breast are frequently seen with it.

In 1812 there died of intermittent fever in all our hospitals, - - -	148
1813 - - - - - -	139
1814 to the 24th of June, - -	4
Total - - - - - -	291

The fatal cases from this disease were almost every one of them of long standing, and complicated with other disease, and, as we learn by dissection, most frequently of the spleen and of the liver. The only two of which I can find dissection-reports were both at Coimbra. One of them was a patient of Dr. Erly's, who informed me, that he lost him in a paroxysm which commenced with extreme severity producing coma,

apoplectic stertor, a dry parched brown and furred tongue which extinguished life in 24 hours after its invasion. This was at Coimbra in October 1812. Another case occurred at the same place to Dr. Tice; this man died in the cold fit; he had been previously in a state of convalescence, but sufficient energy did not remain in the system to produce reaction, which might probably have saved the patient.

At Santarem, much intermittent fever was admitted into the hospitals in 1812; and not a few cases originated in the hospitals or the neighbouring country. Dr. Buchan informed me that they began as continued fevers, and in eight days became tertians; and the contrary not unfrequently occurred, a tertian changing to a quotidian, and that degenerating to a continued fever frequently of a typhoid form. The symptoms in the paroxysm were great determination to the head, coma, spasms of the stomach and extremities; and some had dysenteric affection.

In August 1812, at Coimbra, Dr. Tice in several cases observed an erythematous papular eruption over the whole body.

I shall mention one among the numberless instances which occurred, of the varying nature of this disease: it happened at Alta da Chaô. In the month of November 1812, there were 70

cases of intermittent fever in one of the hospitals, seven of them changed from other diseases to intermittent, and 20 changed to other diseases, most of them to dysentery; six terminated in continued fever, the symptoms of which subsided in a few days, leaving the patients perfectly well. At Alta de Chaô, the quotidian was the prevalent type in all the recent cases. In October 1812, they were in the proportion of 16 to 1 of any other type.

After the effluvia from marshes or the exhalations raised by a powerful sun acting on a humid or luxuriant soil, we found that in those who were convalescent or lately recovered from agues, the causes next in power to re-produce the disease, were exposure to a shower of rain, or wetting the feet, exposure to the direct solar rays, or to cold, with intemperance and irregularity, or great fatigue. Many other causes would excite the disease in the predisposed; but these never failed to do it. In marching troops in a country where this disease is endemic, particularly if they have been lately discharged from hospitals, the above causes should by all means be avoided, since the whole of our experience in the Peninsula showed, that relapsed cases seldom or never got completely well, in the country in which they were contracted, under all the circumstances of a soldier's life. In making calculations of efficient

force, this description of men could not be depended on for operations long continued in the field.

Where the disease was not of long standing, and where it was unmixed with other diseases, it was not found difficult of cure. If it did not readily yield to bark, the other remedies of the same class, mineral and vegetable, were had recourse to, alone or in combination, according to the circumstances of the case. When bark is exhibited, an ounce or an ounce and a half should be given in the six hours before the expected paroxysm, smaller quantities being given during the interval. I have reason to think, that in many cases where bark had been reported to have failed, it had not been given in sufficient quantity. Aromatics or opiates will occasionally be required to make it sit upon the stomach. I directed trials to be made with cinchona cordifolia and lancifolia; the results were, that they cured intermittents in nearly equal proportions. Bark should not be too long persevered in, for we found that its effects by long habit are lost on the stomach; it was therefore deemed advisable, either to leave it off for a while, resuming its use; to combine it with snake-root, aromatic powder or stimulants; or to change it for quassia or other bitters or tonics. Next to bark in efficacy was arsenic; and next to it the zinci sulphas. I have found

this last to sit best on the stomach in the form of a pill; and have frequently given it to the amount of half a drachm a day.

I may mention, that in the Peninsula as well as in other quarters, I have frequently known an empirical prescription with bark succeed in cases where, when given in the usual manner, this medicine had failed. It is as far as I recollect, an ounce of bark, a table spoonful of Jamaica, or half a tea spoonful of Cayenne, pepper, and a whole nutmeg, mixed and given in one dose, a short time after the action of a gentle emetic, and between the paroxysms of recent cases; in two cases out of three this will prevent the occurrence of another paroxysm.

In plethoric habits, some of the symptoms in the hot stage were relieved only by bleeding. Some gentlemen were in the habit of using the cold affusion in this stage.

In the chronic disease, particularly when combined with hepatitis, or swelling of the mesenteric glands, the preparations of mercury were given with success.

A symptom was found to remain not unfrequently after ague had been removed, viz. a great pain in the back part of the head, attended with a sense of fulness; Dr. Buchan found that a

return to bark cured this, after topical bleeding, cathartics, and blisters had failed. I believe that much of the debility which followed intermittents is to be attributed to the use of cathartics. I fear likewise that in this disease as well as in dysentery, a state of debility is not unfrequently induced by the improper and nearly indiscriminate use of mercury; though the cautious use of this remedy will in both these diseases effect a cure or give relief when no other medicine will. Intermittents of long standing as well as dysenteries appear to have some connection with the liver or the biliary secretion. When intermittent fever had continued for some time and proved obstinate, nothing was found to succeed but a change of air or voyage by sea.

Dysentery.

This disease has ever been the scourge of armies. I introduce it after intermittent fever, because these diseases were found to be so generally connected in the Peninsula, and intermittents were found to terminate so frequently in dysentery.

In the regimental hospitals there were altogether admitted 7526 patients; but this was by no means the whole that appeared in the army, the

greater part, and those which were the severest cases of disease, being treated in the general hospitals.

In the regimental hospitals there were admitted in 1812 - - - 3241 cases,
1813 - - - 3420
1814 to the 24th of June, 865

I have in another place * expressed my opinion, that there are two species of dysentery. From the first part of this paper, and from the description of the disease which will be given, it will be seen, whether some cases of the disease which occurred in the Peninsula might not be classed under what I have termed tropical dysentery, which is always intimately connected with disease of the liver, or of the system of the vena portarum.

In the dysentery which occurred in the Peninsular army, there were two stages of disease which it was of consequence to mark, because they required different and almost opposite modes of treatment; the first stage being decidedly inflammatory, and the second accompanied by ulceration, which not unfrequently terminated in chronic disease. Sometimes dysentery from its

* Medical Sketches of the Expedition from India to Egypt in 1804.

commencement appeared to be unattended with fever, and would in a very short time run into the chronic stage. In such cases however, I am inclined to believe the disease to be symptomatic either of disease of the biliary system, or of the mesenteric glands. In most cases, I think dysentery was accompanied by fever of the inflammatory type. The type of fever, however, accompanying dysentery was very much modified by that of the prevailing epidemic. In the hospitals in the Alentejo and Estremadura, in 1812, intermittent fever prevailed or accompanied dysentery, and remittent fever when the army advanced so rapidly and remained some time stationary in the two Castiles in July, August and September. Every case of dysentery which appeared in the battalions of the guards in 1812 and 1813, was accompanied by the typhus gravior, and very generally had a fatal termination, as did many at Ciudad Rodrigo, Celorico, and Viseu, where the same form of fever was prevalent. Dysentery appeared in the greatest number in the early part of 1813; but it had its origin, in the operations of the campaign of the former year; and I date the first appearance of the disease in great numbers to the month of August. The army, during June as well as July, was traversing Castile, where it was exposed to the direct influence of a burning sun, darting its rays through a sky without a single cloud; the troops marching and fighting during the day, and

bivouacking during the night on arid unsheltered plains. They felt at times every vicissitude of heat and cold. In the rapid advance they could not be regularly supplied with food, or had not time to cook it; and not unfrequently indulged in bad wine and unripe fruit. About the 20th July, the army began to make a retrograde movement; and the hospitals, particularly those at Salamanca, containing some thousand men ill chiefly of diarrhœa, dysentery, or remittent fever, were suddenly broken up, and the sick hurried off to the rear to Ciudad Rodrigo, which was the nearest hospital station to the frontier of Portugal. The situation of this place is by no means favourable for an hospital station; it proved a source of great mortality to us; however we had no choice. The town is composed chiefly of ruins, with very narrow streets and some of them without a single inhabitant. It had been so much the object of contest, and alternately the site of the hospitals of all the contending armies, that nearly 20,000 bodies were calculated to have been put into the earth either in the town or under its walls in the course of a few months. Independently of these circumstances, the situation of Ciudad Rodrigo is unhealthy; it may therefore be imagined that its atmosphere was not the purest, and the surprise will not be great, that among the many conveyed to its hospitals from the front, a considerable mortality ensued notwithstanding every effort

of the medical department ably conducted by Dr. Neale. In proportion as means of transport were found, and as soon as the hospital became overwhelmed with sick, they were removed to Celorico, Coimbra, and other stations; and it may easily be conceived, in what state cases of dysentery must have arrived, after having sustained a journey in extent from four to twenty days, conveyed chiefly in bullock cars or on the backs of mules, sometimes under incessant rain for several days together.

The divisions of the army which suffered most from this disease were the 1st, 5th and 6th, and they had been employed at the siege of Burgos, where the men were frequently for 24 hours up to their middle in water in the trenches, sleeping frequently in the open air, or in tents on ground which was moist or quite wet. I believe I have already stated that the clothing of the soldier was very bad, and if I add, that he had little or no bedding, I believe it will not be necessary to say any thing further to account for the great prevalence of dysentery thereafter.

Dysentery was a frequent and fatal disease in our hospitals in the Alentejo from October, and throughout the winter. It proved fatal to patients recovering from other diseases and particularly to those who from wounds had been a long time in hospital; in such cases it was not possible to

treat the disease actively at its commencement, in consequence of the subjects being too much debilitated by former diseases.

In the hospitals at Alta de Chaô, Abrantes, and Santarem, the changes from intermittent to dysentery were very common, and they seemed to suspend the intermittent for a time; but no sooner was the dysenteric affection removed, than the intermittent returned; in some instances both diseases were attacking the same patient at the same time, and when this was the case, the dysenteric symptoms were aggravated.

In October there was a good deal of the disease in the hospitals at Coimbra; Dr. Erly states, that in many instances its progress was slow, but nevertheless fatal; sometimes after the tenesmus and griping were relieved, and the stools had become easy, though they were frequent, nothing that could be devised was found effectual in abating their frequency; and the poor patient at length fell a martyr to protracted sufferings. The fatal termination was observed to be very different in different individuals. Dr. Erly relates a case which he lost, in whom the dysenteric symptoms had completely subsided, and he slipped off in 12 hours with the symptoms of low fever. In three others all the dysenteric symptoms were apparently removed, the stools seemed natural, and the appetite was good; from these favourable ap-

pearances, he was led to hope for the most favourable results; but he was unfortunately disappointed; for they died on the third day after this seeming amendment. In these cases dissection discovered nothing different from the ordinary appearances in dysentery.

There was no place in which more dysentery was seen than in Abrantes in November 1812. Dr. Somers informed me that, since the setting in of the cold and wet weather, cases of dysentery of long standing were rapidly swept off; sometimes in a few hours. He says that men who, to all external appearance, and judging from the power of the circulation, were as well as for many preceding days, have suddenly, and therefore unexpectedly to the practitioner, sunk into dissolution in the course of one hour. This event occurred in numerous instances, notwithstanding every possible alleviation that could be derived from flannel clothing; and warm comfortable bedding had been seasonably provided in the hospitals. Sometimes, when hospitals were far from the seaports, and when the means of transport were difficult to be procured, as at Viseu, Celorico, Ciudad Rodrigo and Salamanca, the practitioner had not these auxiliaries in the treatment, and no doubt their patients would suffer in proportion.

Dysentery was the disease which produced the greatest mortality in the army. In a table of all

the diseases which terminated fatally in the Peninsular army, exclusive of the wounded, the mortality from dysentery appears to have been in the highest proportion.

We lost altogether by this disease, 4717. In the year 1812 we lost - - - 2340
1813 - - - - - 1629
1814 to the 24th of June, - - 748

Considerable as this number may appear, when the disease was pure and uncombined, and when the cases were taken early, it was found very manageable in treatment; but if the first stage had been allowed to pass over, or if it were combined with much visceral disease, it was found to be most obstinate and too frequently proved fatal. I have reason, however, to believe, that had it not been for the extremely unfavourable circumstances under which we practised in this disease, the mortality would have borne a very small proportion to that which actually occurred.

The practice of Dr. Buchan, Dr. Ferguson, Dr. Somers, Dr. Erly, Dr. Vetch, Drs. C. and James Forbes, Dr. Walker, (I may add the lamented names of the late Drs. Gray and Cabbell, and indeed of most practitioners,) was to attack the disease vigorously by depletion on its earliest commencement. I myself had seen much of the benefit

of this practice in the hospitals in and about Portsmouth, in the years 1810 and 1811, with many dysenteric cases received from the Peninsula. The plan of Dr. Somers appeared so judicious, and proved so successful on the first attacks of the pure unmixed disease, that I recommended its being generally followed in the army.

He commenced by copious venæsection, and immediately afterwards he gave pulv. ipecac. composit. gr. xii. every hour, which was repeated three times, with plenty of warm barley water; and profuse sweating was encouraged for six or eight hours. A pill of three grains of calomel and one of opium was administered every second night, and in the intervening day ℥ij. of sulphat of magnesia, dissolved in a quart of light broth; the venæsection was to be repeated, while the state of the strength and pulse permit it, until the stools are free or nearly free from blood; following up this plan with the Dover's powder as a sudorific.

In cases where the pains were excruciating and attended with much tenesmus, the warm bath gave instantaneous relief. This plan being steadily persevered in for a few days, the inflammatory diathesis of the intestinal canal, which had excited symptomatic fever throughout the general system, was found gradually to yield, and make way for returning health. In this stage, gentle tonics, with light

nourishing diet, cautiously exhibited, and at first given but in very moderate portions, were introduced with the happiest effects.

A relapse was every where very frequent in this disease : it was our endeavour to caution the patient against irregularity of any kind; but it was not often in our power to prevent the unthinking soldier from indulging whenever the opportunity occurred. On a relapse from this cause, or if at any stage of the unmixed disease, there was much pain on pressing the abdomen, I have seen the lancet give immediate relief.

At Ciudad Rodrigo, in August 1812, from irregularity or excess in diet, the convalescents from fever frequently suffered an attack on the bowels in the shape of bilious diarrhœa, which commonly ended in dysentery.

The disease was not unfrequently cut short by the above plan; if however the second stage advanced, and the disease became chronic, a different mode of treatment was pursued, and not unsuccessfully, if the disease had not been of long duration, the intestinal canal much disorganized, or not complicated with other diseases.

The first indication in this stage was to relieve the tenesmus, and procure easy stools: with this view, ipecacuanha was given sometimes with calo-

mel and sometimes without it. The neutral salts were given, or oleum ricini, jalap, and various medicines of the same class. The second indication was to diminish the number of stools, and to restore tone to the alimentary canal; with this view, Dover's powder, pulv. cret. composit. cum opio, astringents and demulcents with aromatics were given, occasionally interposing laxatives, and obviating particular symptoms as they occurred. Lastly, an infusion of bitters was given to restore tone to the relaxed intestine.

The form in which we saw dysentery most frequently, was in combination with other diseases, or when there was diseased action, or disorganization of the viscera of the abdomen. I found that the viscus most frequently affected was the spleen, next to that the liver; which was indeed diseased in nearly an equal proportion of cases with the spleen. The mesenteric glands were not unfrequently found affected; and sometimes, the pancreas was one mass of disease.

It was when there was disease of the liver, or when there existed diseased action of the biliary system in dysentery, that mercury was found so highly useful, and it was from its singular utility in this combination of disease, that the practice has become so general of treating it, in all its stages, by this remedy; a treatment however which must in many cases be highly improper.

In cases where, along with dysenteric symptoms, we detect the obscure symptoms of chronic hepatitis, namely, dull pain in the region of the liver, in the right shoulder, tenderness on pressure, dull brown colour of the skin, or adnata, with uneasiness when the patient lies on any but the right side; in such cases, mercury never fails to cure, or at least relieve. In other dysenteric cases, likewise without pain, but with uneasiness in the right side, or epigastrium, and when pain in the right shoulder is complained of, the disease is successfully treated by mercury. There was likewise a chronic disease, where not even the most obscure hepatic symptoms could be detected, most frequently consequent to acute dysentery, where without fever, and with but few stools daily, diseased action was kept up: mercury introduced so as to affect the system gently and gradually, with a light nourishing diet, effected a cure. Further, in that combination of the disease, with obstruction of the mesenteric glands, mercury appeared to be the only remedy that afforded relief.

These appeared to me to be the only cases of this disease in which mercury is pre-eminently useful; in the early stage of the acute and unmixed disease, and before repeated venæsection has been performed, it will aggravate the symptoms. In the more advanced stage of the disease, particularly when there is either hectic fever, with extensive

erosion, or ulceration of the intestine, it was invariably found to hurry it on to a fatal termination.

In most of the cases where the use of mercury was indicated, it was advisable to introduce it gradually and gently into the system. Sometimes there existed irritability of the stomach, and there was always very great debility; great circumspection was therefore necessary, in the introduction of a remedy, which of itself is so apt to produce debility, at the same time that it removes the urgent symptoms of disease.

It was reported to me, that this disease was apt to recur whenever the system ceased to be affected by mercury, and that relapse was more apt to occur after its use; however this may be, the cases are very numerous, where no other remedies gave the patient a chance of life.

Ipecacuanha, opium, and other articles were frequently given with calomel in small and frequently repeated doses; and some gentlemen gave the blue pill until the mouth was affected; but the general opinion was, that friction of the abdomen with mercurial ointment gave least irritation, and at the same time, produced less debility.

During this practice, gentle purging by means of oleum ricini or the neutral salts was continued,

and the combination of an opiate with the diaphoretic was advantageously given at night or oftener, to procure sleep and allay irritation.

As adjuvantia, and to relieve troublesome symptoms, the warm bath, fomentations, and blisters to the abdomen, various enemata, warm clothing and flannel rollers, were usefully employed according to circumstances. In the chronic stage, and when there was much debility, success was not to be expected from any mode of treatment where the patient was unprovided with warm clothing and bedding; more particularly when the treatment was by mercury; and I regret to say, that not unfrequently we felt the want of these adjuvantia.

I have mentioned elsewhere * the plan recommended by Dr. White, of treating chronic dysentery by bandaging with flannel, and by the application of adhesive plaster to the abdomen. It was likewise tried in the Peninsula, and the reports in regard to it were extremely favourable. Both the plaster and bandage were by some gentlemen applied in every stage of the disease, and were said to have been found most serviceable in many cases both as affording an equal support, and keeping up a degree of warmth on the surface of the abdomen. Doing this in that situation, as well as in the lower extremities, was found to be very conducive to the

* Medical Sketches of the Expedition from India to Egypt.

cure of the disease; it is, however, no doubt in chronic dysentery, that this treatment will be found to be chiefly applicable.

The combination of nitric acid with opium was tried, and it was said to have been of use in a few cases of long continued dysentery, complicated with diseased viscera, where frequent stools, unaccompanied by pain and tension of the abdomen, were the most urgent symptoms.

Mr. Woolrich, in the hospitals at Celorico and Castello Branco, found great benefit from a mixture of balsam of copaiba in gum arabic, with an infusion of calumba, using occasionally gentle mercurial friction, flannel bandages, and a milk diet.

When frequent stools without pain were the most troublesome symptoms, the vegetable astringents, as hæmatoxylum, catechu, and kino, given in large quantities of mucilage, and assisted by opium, gave much relief.

Under the same circumstances, I have very frequently seen enemata afford signal relief, as I have also witnessed when there was erosion or ulceration of the intestine. I believe there exists a disease, often the consequence of dysentery, where with much debility there only remains abrasion or incipient ulceration of the intestine: such disease I have always considered as local, and within the

reach of topical applications. With this view of it, I have for many years been in the habit of throwing up a variety of substances, as enemata; for dissection shews, that ulceration is almost always in the great gut, and within the reach of external applications. I have accordingly used astringents, emollients, opiates, and sedatives, according to circumstances; but I have oftenest afforded signal relief, by a tolerably strong solution of superacetas plumbi. Some gentlemen used an infusion of ipecacuanha, some the aqueous solution of opium, and some starch, rice-water, or milk.

It is, however, sometimes an objection to enemata of every description that the rectum being irritable or inflamed, a pipe cannot be introduced without adding to existing inflammation; in such cases, the introduction of a grain or two of opium into the rectum, would frequently allay pain, and in some cases tenesmus, when every thing else had proved ineffectual.

In the combination of the disease with visceral affection, Dr. Irwin met it successfully in several cases with the conium maculatum; and in some cases, by combining this medicine with calomel.

Among the sequelæ of dysentery, one of the most frequent is the tumid abdomen which usually proceeds from three causes, first, an extrication of air into the intestinal canal; 2ndly, enlargement

of one or more of the abdominal viscera, most frequently the spleen and liver; and 3rdly, effusion into the cavity. The whole of these were not unfrequently combined, as the dissection reports forwarded to me testified most amply.

A great many of the bodies of the dysenteric were inspected, and a great uniformity was found in the morbid appearances. In those inspected under the superintendence of Mr. Guthrie, Mr. Hennon, and Mr. Arthur, at Elvas, Abrantes, Celorico, St. Andero, and Bilboa, they found ulcuscula, which had a healed appearance, being covered with a delicate extension of the villous coat, or a reparation of a new substance. Purulent collections formed in various parts of the canal. The liver, in many of these cases, was found hardened, of a dark complexion, enlarged, and with preternatural adhesions. In some cases, it appeared smaller than usual, and in these, the spleen was large and much diseased. They found the pancreas diseased not unfrequently; and sometimes the gall-bladder or its ducts.

The reports of most other gentlemen were similar to these. In a majority of cases, it was found, that the colon from the arch downwards, and the rectum more especially, were throughout in an ulcerated sloughy state; the liver and spleen in general preternaturally large, and verging to suppuration. One spleen weighed three pounds, four ounces.

In a report forwarded by Dr. Somers, of the appearances in the bodies of the dead of dysentery at Abrantes, which was stated nearly in the above words, he adds, " surely these occurrences, upon immediate dissection, would most forcibly and decisively seem to point out the negative cause of the melancholy catastrophe, namely, the fatal omission of the saving lancet."

I have dwelt so much upon the subject of fever and dysentery, that I must greatly contract what I have to say of the remaining diseases which prevailed.

Pneumonia

Is one of the most frequent diseases of the soldier, and I have usually seen it prevail in a greater proportion in other services, than it did in that on which I am now treating.

1604	cases were admitted into the regimental hospitals in - - - -	1812
1481	- - - - - -	1813
942	- - - to 24th of June,	1814
4027	Total.	

There died in all the hospitals, general as well as regimental, in 1812 - - - - 58
1813 - - - - 131
1814, to 24th of June, - 96

Total 285

As it usually appears in the soldier, whether in the camp or in quarters, this disease requires the most prompt and vigorous treatment, and nowhere is the lancet so much to be depended on.

The military practitioner, in repeatedly abstracting blood, is not to be guided by quantity, or even by the appearance of the blood, but by the relief procured. If this relief be not afforded by a large bleeding, in a few hours the vein must be again opened; and this is to be repeated again and again until respiration is freely performed, and pain of the thorax removed. It cannot be too strongly impressed on the young military practitioner, that neither blistering, sudorifics, purging, or other remedy, can supply the place of bleeding, nor must he judge by what he has seen in private practice, where this sudden abstraction of a large quantity of blood would perhaps be improper.

Pneumonia prevails more among soldiers than in civil life; and well defined as this disease is by nosologists, it requires the experienced military prac-

titioner to detect it. It frequently happens, that the patient so far from exhibiting the well known diagnostics, appears to labour under every symptom of oppression and debility. Until strictly questioned, he complains of nothing so little as his breast. The true nature of the disease is not detected without the most experienced and scrupulous examination; nor does it show itself in its natural colours, till the functions of the oppressed and congested lungs are in some degree restored by abstraction of blood. Without this relief, it cannot show itself; for re-action under such circumstances cannot take place, and the practitioner is led into the fatal error of treating the disease as low fever.

This form of disease is nearly peculiar to soldiers, and their peculiar situation; for it seldom in England affects the other inhabitants, as it results from sudden or incautious exposure to cold after breathing for some time the debilitating or vitiated atmosphere of a confined, ill ventilated quarter, or crowded barrack-room.

This form of pneumonic inflammation occurred particularly in the second division of the army, and I got the same account of it from the late Mr. M'Intosh, Mr. Guthrie, and Dr. Fergusson, who in succession superintended in that division of the army, from Mr. Higgins, who superintended the cavalry division of the army, and from Mr.

Thomson when in superintendence of the seventh division.

Dissection of the dead frequently showed, that inflammation had spread to the pericardium and heart, constituting carditis.

Phthisis Pulmonalis.

In England, this disease is as frequent and fatal in the army, as it is in civil life; in Spain and Portugal, we found it of much more rare occurrence.

I find that there died of this disease in all the hospitals, regimental as well as general,

in 1812 - - - - -	49
1813 - - - - -	158
1814 to 24th of June, - -	72
	279

which of the total mortality, excluding that from wounds, is a small proportion, and very widely different indeed from what I have found to be the case in the army in England. Under ordinary circumstances, and when no epidemic or contagious disease prevailed, I found in England the deaths from consumption to amount to one-fifth, one-fourth, and in some regiments even as high as one half of the whole mortality.

The expatriating phthisical patients to the milder southern climates, particularly to that of Portugal, has for many years been a highly sanctioned practice in England. On going to Portugal, I was desirous to obtain information on this subject, and particularly after reading the excellent paper of Dr. Wells in the 3rd Vol. of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. I circulated a series of queries on the subject, and the sum of the answers from the principal medical officers at the stations in Portugal where we had hospitals is as follows. In the period included, from the 25th June to the 24th September 1812 it appears, that the cases of phthisis at six hospital stations amount to 54
Of remittent and intermittent fever to - 1880
therefore the proportion of phthisis pulmonalis to remittent and intermittent fever is as 1 to 35.

The origin of the greater part of the cases is not distinctly stated; but of 16 treated at Lisbon 9 evidently originated in England, and 7 in Portugal sent from different hospital stations to Lisbon.

It clearly appears, that in the early stage of consumption, that is to say, when suppuration and ulceration have not yet taken place, the disease is checked by the climate of the Peninsula; but that when suppuration and ulceration have taken place, it runs even a more rapid progress than in England;

and I have made the same remark, in regard to the East and West Indies.

Of 30 cases of phthisis, 14 died and one was not likely to recover, and the remainder continued in hospital to the end of the quarter. Of 24 at Coimbra, the proportion of deaths is not stated; but it is stated, that the disease in general proceeded rapidly to a fatal termination. The progress of phthisis appeared to be accelerated by attacks of intermittent fever, and the phthisical predisposition did not appear to confer any exemption from the attack of that disease.

I repeated my queries, and got the results of another quarter's inquiry, and I found that in this period at Alta de Chaô in Estremadura,

4 cases of phthisis appeared, 2 of which originated at Alta de Chaô,
7 cases of remittent fever 5 Do. Do.
526 cases of ague - 192 Do. Do.

At Castello Branco, a very high and dry situation in Beira,
Of 171 cases of continued fever 17 originated there
169 intermittent 38 Do.
No case of phthisis.

At Lisbon,
3 cases of phthisis admitted; none of them originated at Lisbon.

31 cases of remittent and intermittent fever; 17 originated at Lisbon.

At Santarem there appeared during this period 10 well marked cases of phthisis, and 666 cases of intermittent fever.

At Celorico,
2 cases of phthisis,
50 - remittent, and
66 - intermittent fever.
2nd division of the army about 6,500 strong;
4 cases of phthisis pulmonalis admitted,
551 - remittent fever,
1566 - intermittent do.

On the whole, the result of much inquiry was that phthisis and scrophula, although occasionally occurring, are rare diseases in Portugal. There seems to be but little predisposition in the natives, or in those some time resident in Portugal, to inflammatory and pulmonic complaints; and the latter seem to be less violent and more easily curable than in England. It would appear, that persons coming to Portugal or Spain, and I may add to part of France, from colder climates, with only a predisposition to phthisis, with tubercles in the lungs in a quiescent state, or not actually suppurating, do receive some benefit from the sea voyage or change of air, or rather that the disease

does not make any progress. When however suppuration and ulceration have taken place, the result is almost always as fatal and in as short a time, as if the experiment had not been tried of change of climate.

Dr. Fergusson, Dr. Somers, and the late Dr. Gray, resided each of them several years at Lisbon, and saw most of the phthisical cases sent there from England, particularly Dr. Somers, who resided there four years as a practising physician; and it is the result of the experience of these gentlemen that though the cough abated of its violence, as might naturally be expected from the milder temperature, that patients seldom received any other sensible alleviation. Dr. Somers informed me, that he never witnessed a complete recovery; insomuch, that for the last two years, he uniformly set down the cases for return to their native country, resting assuredly some hope, in favourable seasons, on the probable efficacy of the voyage. He informed me, that he had never seen the genuine British phthisis originate in Portugal.

When I was at Montpellier I learned from the professional gentlemen there, that the result of their experience on patients sent thither in these stages of phthisis, was nearly what I have stated to have been in Lisbon. They further informed me, that the high and very dry air of that place

was particularly unfavourable to some species of the disease, and that not a few cases originated in that country.

The situation of Montpellier is singular; it will be recollected that it is intermediate between the Pyrenees and Alps: both are to be seen from the beautiful public gardens of the town. The vicinity of the mountains to the north of Montpellier renders the climate in winter and spring very changeable, and this is found to be a cause of much mischief to phthisical patients. Those cases which originated in the country were generally from the neighbourhood of Montpellier. There are other situations that appear better for the consumptive than Montpellier; viz. between that place and Nismes, and near the banks of the Garonne from Toulouse to Bourdeaux. Lisbon has many disadvantages for the phthisical, from the vicinity of a mountainous country and the neighbouring sea, and from the total want of protection in all the houses against change of temperature.

The result of our experience in Walcheren was, that the air was in general favourable to pulmonic complaints. A physician from whom I have derived a good deal of the information which I now submit to the Society, in that island got entirely free of an asthma, under which he had laboured for many years of his life.

The appearance of Dr. Woolcombe's work excited my attention to this disease as it appeared in the troops stationed in Hampshire, Somersetshire, Dorsetshire, and the neighbouring counties then under my medical inspection. The troops were mostly militia regiments, the greater part of them in garrison at Portsmouth, Bristol, or Weymouth. The surgeons had the best means of knowing the origin and every particular of the cases which occurred in their corps, and, at my request, paid much attention to them.

By a tabular statement, which early in 1811 I drew out from the reports of these gentlemen and my own examination of the cases, I find, that from July 1808 to February 1811 I have a minute detail of 52 cases; the result is as follows:

31 died,
7 were cured,
7 were getting worse,
4 were better,
1 was discharged from his regiment,
2 went to live with their friends, fate not known.

Under the head causes:

3 originated after continued fever,
18 - - Pneumonia,
7 - - Catarrh,
8 - - Hæmoptysis,

5 - - Rubeola,
3 - - Syphilis,
2 - - Asthma,
1 - - Scrophula,
3 from hereditary disposition,
1 from playing on wind-instruments,
1 had obstruction of the abdominal viscera.

Of these men,
18 were labourers before they became soldiers,
13 were weavers,
5 Shoemakers,
3 Tailors,
2 Gardeners,
1 Flax-dresser,
1 Clothier,
1 Hatter,
1 Needle-pointer,
1 Butcher,
1 Nailor,
1 Blacksmith,
1 Schoolmaster,
2 Unknown.

8 of them occurred in the Lancashire Militia,
7 - - - 8th Veteran Battalion,
6 - - - Inverness Militia,
6 - - - Sussex Do.
5 - - - Worcester Do.
4 - - - North Gloucester,
3 - - - East Suffolk,

3	- - -	1st York,
2	- - -	East Middlesex,
2	- - -	Glamorgan,
3	- - -	North Hants,
1	- - -	Northampton,
1	- - -	Pembroke,
1	- - -	Oxford,
1	- - -	Dorset,
1	- - -	11th light dragoons.

It is observable, that none of these cases occurred in the regiments of the marshy counties in which intermittent fevers are endemic.

Rheumatism.

The number of patients which appears to have been admitted into regimental hospitals with this disease is 4,933; a great portion of the cases had their origin from the duties of fatigue at the siege of Ciudad Rodrigo, Badajos and Burgos.

Mr. Paddock was at Santarem in November 1812, successful in some old chronic cases which had resisted the usual treatment, by giving spirit of turpentine in doses of ℥1 twice a day. He occasionally gave ℥js as a purge. As it is now usual to give doses of ℥ii of this in tape-worm with safety, a free trial may be made.

After the retreat, and as late as February 1813, rheumatism of the feet was very prevalent, particularly in the 5th division of the army. Mr. Hill, who superintended the hospitals in this division, informed me that the sick, as well as the convalescents, complained of distressing pains in their feet; nothing but opium and keeping their feet in warm water, was found to give them relief; by the warm water the hardened cuticles were removed and perspiration induced.

Some gentlemen reported favourably of the arseniated solution of potash in chronic rheumatism.

Tetanus.

This very formidable disease, as I have already stated in the first part, was always very prevalent among the wounded after the great battles.

I was at some pains to collect information relative to a disease, which was so frequent and fatal in the Peninsula: for among several hundred cases detailed, there are very few, where this disease had made any progress, in which remedies however varied seemed to have any influence on it.

An interesting case is related by Mr. Nixon, Deputy Inspector of hospitals, which occurred in

the march of the guards through Gallicia, and in which the patient recovered apparently, in consequence of long continued accidental exposure to severe wet and cold.

The symptoms of the disease occurred from a slight wound of the finger, and are stated to have been unusually severe. As it was impossible to think of leaving the man in the wretched village where he was attacked by the disease, he was carried on a bullock car after the battalion. During the first part of the day he was drenched with rain, the thermometer standing at 52°; but after ascending one of the highest mountains in Gallicia the snow was knee deep, and the thermometer below 30°. The patient was exposed to this inclement weather from six o'clock in the morning till ten at night, when he arrived half starved to death, but perfectly free from every symptom of tetanus.

A successful case is related by staff-surgeon Dakers, where the patient was attacked by the disease on the 17th day after a dreadful accident which rendered amputation of the arm necessary, and by which the man was also terribly scorched, the sternum fractured, and one eye destroyed. The spasms were principally confined to the posterior muscles, as it is stated that the jaw was not much affected except during the convulsive fits, which were frequent and severe for about a week

before any favourable change took place. The treatment consisted in exhibiting a dose of laudanum, which did not exceed 20 drops every second hour, and in the intermediate hour a dose of carbonate of potash in mint water, which was gradually augmented; but 15 grains was the largest dose. The patient was also put into a warm bath, of which the water was rendered alkaline, twice a day. He recovered perfectly in about three weeks.

A case is related by assistant-surgeon Fiorilli, of the 1st German hussars, which was successfully treated by the same remedies. The disease followed a lacerated wound of the foot. The alkali and opium were given alternately every half-hour, in the quantity of three grains of the former, and one-fourth grain of the latter; but the dose was gradually augmented, and given every quarter of an hour. After twenty-four hours, the patient felt much relieved, and a gentle diaphoresis took place. The medicine was gradually diminished, and the patient in a few days recovered. The wound was covered with fomentations during the treatment.

Surgeon Brown, of the mounted staff corps, saw several cases at Elvas, after the battle of Albuera. Opium was the favourite remedy, and every case so treated died.

Two young stout officers, the one wounded in the arm, the other having suffered amputation of a finger, were attacked with violent spasms about the throat, and the jaw began to be affected in both. Emollient poultices were applied to the wounds, they were bled largely, and in one the bleeding was repeated; their bowels were opened, and the antiphlogistic regimen was strictly observed. These alarming symptoms yielded to this plan of treatment.

In the case of Col. Sir George Elder, successfully treated by Dr. C. Forbes, opium, calomel, mercurial friction, tinct. opii, in large quantities rubbed in on the surface of the body, wine, and spirits in the form of punch, were liberally administered, so that drowsiness was produced by the opium, and the mouth was affected by the mercury. But although considerable benefit was derived from the use of these remedies, Dr. Forbes is of opinion, that to the rigid perseverance in purgatives given in doses to produce a full effect daily, must be chiefly attributed the removal of this formidable disease. A solution of the sulphat of magnesia in infusion of senna answered better than any other purgative, and it was daily given in a sufficient dose to procure a copious evacuation, which was always dark coloured and highly offensive.

This terrible disease is too easily distinguished

to require detailed description. It occurs in every description and in every stage of wounds, from the slightest to the most formidable, from the healthy and the sloughing, from the incised and lacerated, from the most simple and most complicated. It occurs at uncertain periods; but it is remarked, that if it does not occur for 22 days from the date of the wound, the patient is safe. It terminates in the second, third, and fourth days, and even as late as the 17th and 20th day, though usually it was not protracted beyond the eighth. Mr. Guthrie, who attended much to the cases that occurred at Toulouse, as well as those which occurred at Talavera and Salamanca, divided the disease according to its short duration or protraction, into two species, viz. acute, and the mild, which he thought were independent of peculiarity of constitution. In most cases the patient is cut off by a terrible spasm, but he sometimes dies as if exhausted by the continuance of excruciating pain.

The arterial system is scarcely at all affected; except that frequency of pulse is produced by the excruciating spasms. The skin is at first natural, but as the disease advances is covered by a cold sweat; there is throughout obstinate constipation of the bowels, which require the most drastic purgatives, with a great sense of uneasiness about the præcordia; the tongue is always moist.

The remedies which have been chiefly trusted to for the cure of this formidable disease are opium, mercury, wine, warm and cold bath, venæsection, ipecacuanha and digitalis in large doses, enlargement of the original wound, and amputation of the limb. These have been tried alone and in various combinations, and I am obliged to confess that the whole failed, in almost every acute case of tetanus which occurred. The three first have been administered in unlimited doses without effect; the cold bath is worse than useless.

The reports of Dr. Emery, Mr. Guthrie and other gentlemen after the battle of Salamanca, are evidence that frictions of mercurial ointment, so strongly recommended on various occasions, completely failed of making any impression on the disease. They tried inunction of the whole body three times a day, with strong mercurial ointment in unlimited quantity. Mr. Guthrie informed me that after the battle of Toulouse, a fatal case occurred in a man strongly under the influence of mercury, which he had used previous to the action for the cure of the itch.

From the extensive trials which were made with us with opium and mercury, I consider them as perfectly inert in this disease when acute or fully formed; they should only be used as adjuvantia, and we must look to other means; wine,

brandy and other stimulants were found equally useless.

The submuriate of mercury was given in very large doses alone, and in combination with as much ipecacuanha as could be retained on the stomach, but with no effect on the acute and fully formed disease. In the mild tetanus benefit has been derived from hydrargyri submurias, as it has indeed from many other remedies. The operation of calomel on the bowels was always useful; and singularly so in the mild disease distinguished by the spasms coming on slowly and continuing of the same violence; instead of their sudden accession and their continuing with increasing violence as happens in the acute fully formed tetanus. In this, calomel cannot be depended on, for we found the patient carried off before the medicine could have any effect.

Venæsection had also a fair trial in several quarters, and in a great many instances. Mr. Guthrie gives three cases in the hospitals at St. Andero out of many which are detailed, where this was the principal remedy. In the first of the three the patient had a wound of the back of the hand, when tetanus appeared and advanced with rapidity. This man was bled nearly *ad deliquium* several times with good effect, calomel and diaphoretics being given at the same time, and he recovered. It is worthy of remark, that the hospi

tal gangrene affected his hand at the same time, and destroyed a considerable part of it.

In the second case the patient was bled in the same manner, with an evident amendment of the symptoms; so much so indeed that he suffered but little from spasm, and could open his mouth very well, when he was seized with diarrhœa, which, in the debilitated state he was in, carried him off. In the third case of a man of a sanguine temperament, and suffering from acute tetanus, venæsection pushed to the utmost totally failed.

The warm bath in some instances gave a little relief, and cold bathing did the same. A case that occurred at Orthes under the superintendence of Mr. Thomson was somewhat similar to Mr. Nixon's case.

Tobacco glysters tried in the advanced stage of the disease seemed to have no effect.

Free incisions in and about the original wounds are of little avail in the acute and fully formed disease. Amputation as recommended by the baron Larry totally failed in the fully formed disease: it was tried in many cases at Toulouse. Indeed I believe this gentleman's opinion is altered since he published the result of his experience in Egypt. I had some conversation with him on the subject; but I have been recently informed by

Mr. Guthrie, that the baron distinctly acknowledged to him, that the loss of the French army after the battle near Dresden was principally from tetanus, when of course this practice must have been fairly tried.

The warm bath procured only momentary relief.

I am in possession of the detail of several cases where digitalis was tried; in one of these by Mr. Guthrie, the patient took digitalis with purgative and diaphoretic medicines after he had been largely bled to the amount of 50 ounces at a time. By the slow progress which the disease made, it is that species of it which I would denominate tetanus mitior. It commenced on the 12th, but was not noticed until the 16th day after the injury, which was a very slight one on the foot. It was immediately enlarged extensively; 20 drops of the tincture of digitalis every two hours were given two days after with two grains of calomel and pulv. antimonialis. Pulse 120. The same evening the quantity of digitalis was increased to 3ss. pulse 130. At night the medicine increased to 50 drops. The next morning the pulse was 96, the bowels regular, and the man in all respects better. On the 19th day the mercury had affected his mouth, the digitalis had been continued, the pulse 100, the disease rather increasing. The same night his pulse fell to 90,

and he was easier. On the 24th he was much better, but very weak, his mouth sore, the pain less, had suffered from profuse perspiration, the pulse in a recumbent posture 96. It was thought advisable to reduce the digitalis to 40 drops, and to omit the pill. On the 25th the digitalis only taken four times a day, the jaw could be partly opened but was still stiff, free from pain excepting the groin of the left side; 50 drops of tinct. opii at night to procure sleep. The next day, the 26th, considerably worse, and 80 drops of tinct. were given every two hours. On the 27th day the pulse sunk to 70 and became irregular, some pulsations being full, others small, which was for the first time observed, and the digitalis was diminished, and then omitted during the night, but resumed on the 28th day, and with some little advantage. On the 29th day of the injury and 13th of the treatment, he got out of bed to go to the close-stool, which he effected, returned to bed, laid down, and expired without a groan, apparently from the influence of the digitalis. The jaw remained fixed to the last, and he was never entirely free from spasms. In this case the digitalis appears somewhat to have averted the progress of the disease, but could not cure it, the man daily declining in strength.

I ought to mention that æther, camphor, musk, and other antispasmodics, as likewise the alkalies, were tried, and found equally unsuccessful.

At this moment I am unable to say precisely the number of cases that were treated as they are included in the returns under the head wounds; however there were some hundred cases affording room for extensive trials. I am however obliged to confess, that little or no dependence is to be placed in any of the remedies, and I have to regret that the method of cure is yet to be discovered. In pointing out what military practice has enabled us to do, towards ascertaining the effects of medicines in large doses, and carried to their ultimate extent, I hope to leave the ground more open for the trial of new remedies. Judging from the very few successful cases, we may be disposed to trust principally to blood-letting, purging, opium and digitalis. As the disease appears to terminate in free sweating in some of the few successful cases, Dover's powder may be useful, and the vegetable alkali and tobacco fume are deserving of further trial.

I should next proceed to phagedenic ulcer, or hospital gangrene, as it is termed. We had such ample experience of this disease, that I shall reserve what I have to say of it to a future communication.

There was sometimes not a little trouble and embarrassment by leeches getting into the soldiers' throats, in the Alentejo; but on this and other subjects which are immediately surgical, I have the less occasion to enter, as they are likely to fall into

the hands of one, who, while he can bestow time and attention on them, is master of the subject. From the specimen which my friend Mr. Guthrie has lately given in the first part of his system of Military Surgery, the medical world will have no cause to regret that this task has devolved on him.

In finishing what I have to say on the second part of my paper, I beg to state that the observations apply principally to the early part of the period, and I have not had leisure to go with requisite minuteness beyond February 1813.

I beg in this place to add a statement of the number of deaths, specifying the diseases, from December 1811 to June 1814; and I have to express my regret that from the nature of the service on which we were engaged, it was not found possible to obtain correct returns every where of the numbers of each disease treated, distinguishing under separate heads those who recovered, were sent to England, or died. This has always been done in the Regimental Hospitals, but was found impracticable in the general hospitals.

Since this was written, and when I was at the hospital at Yarmouth, visiting the wounded who arrived there from Waterloo, Dr. Buchan shewed me a case of chronic tetanus; the detail of it was drawn up at my desire by one of the young gentlemen at the hospital, and is as follows.

John Clail, (ætatis 22), admitted July 13th 1815, from Flanders, was attacked about four years ago, with ague, from which he recovered so perfectly that he served during the campaign previous to the retreat from Burgos. In consequence of the fatigue he underwent, and the privations he suffered, he was attacked on the retreat by a fever, the first symptom of which was great debility, which lasted about a month before he was sensible of the disease. He was not in hospital during this month; he can give no account of the source of the disease, because he was delirious from the commencement, and the first thing he noticed upon recovery was the inability to move his jaws; he has been blistered, used friction, and taken purgatives without effect. At times he has been able to open his mouth so far as to admit one of his fingers; he is not affected by moist or foggy weather; cannot say whether he is worse in easterly winds or not; but thinks he is relieved by warm weather. The disease was never alleviated by exercise, nor by increased perspiration, unless when he has perspired during the night; except in this instance he has never felt better in the morning than in the evening, nor does the heat of the bed affect him.

Has never experienced any stiffness or spasm of the muscles of the neck, or top of the shoulders, even when sleeping in the open air during the campaign.

Was wounded on the 18th of June, by a musket ball, which entered at the extremity of the metacarpal bone of the little finger, and ran across the extremity of the metacarpal bone of the ring finger, directly under the skin, exposing the flexor tendons of the fingers, and then entered at the first joint of the fore-finger, and ran obliquely across to the second joint.

At present the wound looks rather foul; discharge unhealthy; granulations glossy and rather pale. Felt his complaint no worse after he was wounded, and never did so till he arrived at the hospital, at which time his jaws were completely shut. He is at present much in his usual state; he can open his mouth so as to put out the apex of his tongue. Has no hardness over the masseter muscle, but his right cheek is fuller than the left, and fuller than natural. The submaxillary glands seem a little enlarged and indurated.

General health pretty good. Skin cool. Tongue appears clean. Belly rather bound. Appetite impaired. Looks dejected. Pulse 80, and feeble.

Before leaving this part of my subject, I ought to explain that for the three first months in 1812, and before I had fully established the forms of returns of the diseases and deaths in the Peninsular Army, the statements are frequently imperfect,

there being no specification of disease, or, at most, all are thrown into five or six general heads.

PART III.

Prevention.

I come now to the third and last part of my paper, that which relates to the prevention of disease, and diminution of mortality. As the general causes of unhealthiness in the Peninsular Army, have been entered into in the first part of my paper I shall only offer a few remarks. It is not my intention to enter on all the causes of unhealthiness of armies.

Much has been done in the naval service of the country, towards rendering sailors healthy on shipboard, and during long voyages. The discoveries and improvements which led to this object, had their origin with Captain Cook; but the greatest part has been effected by professional men, who have reflected lustre on that branch of the public service, more especially a Lind and a Blane. Very much has likewise been effected in the army, and the nation at large is indebted to Sir John Pringle; Monro, Brocklesly, and others, likewise did much; but great improvements have likewise been introduced within the last twenty years, and a very great degree of health attained in our armies. Aided by

the discoveries which of late years have been made in chemical science professional men in the navy and army have, by experience and observation, introduced improvements, which in ordinary circumstances keep not only our sailors and soldiers, but felons in jails and hulks, as well as the prisoners of war who fall into our hands, more healthy than the same classes in civil society *. In the navy, this high degree of health is obtained and kept up during the longest voyages, and in every climate; but there are circumstances, which necessarily will often prevent our fully attaining it in armies.

A fleet under ordinary circumstances, when the discipline and internal economy of the ships are good; having the store of warm clothing and wholesome victuals, with which they are always supplied; having likewise the means of perfect ventilation, and cleanliness; and above all, having it in their power to keep disorder and intemperance in check, can attain a degree of health which can never be expected in an army on active service. A retrospect to the historical part of this paper will show, that it would be in vain to look for this extreme degree of health in the army which marched over great part of Portugal, Spain, and France.

The same high degree of health, the army does however often attain on home service; and I have seen it in some corps, which had been some time

* A statement is subjoined of the state of the hulks at Portsmouth, for a period of the last ten years.

stationary at the Cape of Good Hope, India, and even in the West-Indies; and I have reason to believe that of late years, it has likewise been attained even on the coast of Africa.

It is a self-evident truth, that no army can be healthy, the materials of which are either infirm or unsound. The duty of inspecting men entering the service, or sent abroad for the active duties of the field, is a most important one to the state, and should be most scrupulously performed. Lads unequal to the harassing duties of the service, and men whose frame has been worn out by disease or climate, ought to be uniformly rejected; as well as those labouring under any disease.

During the period I was stationed at Portsmouth, a regulation took place, which I know to have been productive of the best effects to the service, and which now obtains at every port where embarkations take place. Previously to the embarkation of any troops, and as soon as the agent for transports reports a vessel ready for their reception, she is inspected by a medical officer appointed for this duty, who examines the quality of the water and of every article of the provisions, the space and accommodations allotted for the troops, as well as the sick births, and the means of preserving cleanliness, ventilation and fumigation, on all which subjects he makes a report. As soon as the troops are embarked, he inspects them on board, reporting any sick that may be among either the men, women,

or children; how far they preserve cleanliness and ventilation, the state of the assortment of medicines and medical comforts. Whenever troops arrived at Lisbon or other parts for the service in the Peninsula, a similar inspection was made previously to their landing, and a report was forwarded to me, by the inspecting officer, of the casualties on the voyage, and an account of any diseases which had appeared.

It is of consequence, that troops coming to a climate different from their own, should be somewhat habituated to it before they enter on the fatigues of the service. Whenever it could be done, (which was rarely) corps were detained for some time at the port at which they landed. New levies, or regiments having many recruits, should, if possible, be first sent on garrison duty.

The practice was a good one, of sending troops destined for the Peninsular service, to Gibraltar or Cadiz for some time before they joined the army; recruits by this means attained the habits of soldiers, and were inured to the climate and peculiar service, before they entered into all its fatigues. In order however to obtain the full benefit of this measure, it is not sufficient, that troops remain in an inactive state in these garrisons; they ought to be frequently marched, and by degrees in the sun, otherwise they will always be found to tumble down with the fatigues of service when they join an army engaged in the active operations of the field.

Corps were always found most ineffective, and sending most men to the hospitals, the first year after they came out to the Peninsula; they were proportionately less ineffective the second year, and still less the third; and I believe, that in making calculations for measures in the field, it would be found, that 300 men who had served five years were more effective and more to be depended upon than a regiment of 1000 men which had just arrived. I know from experience, that this applies still more particularly to the service in India. The case of two regiments in the Peninsula, is illustrative of this, viz. the 7th and 40th; both of them particularly sickly battalions, and losing at one time many men by disease. The 7th regiment from the 19th of August 1811, to the 20th of May 1812, lost 246 men; of this number were 169 recruits out of 353 landed the preceding June, while out of 1145 old soldiers in this regiment, there died in the same period only 77. In the 40th regiment of 170 deaths, there were 104 out of 450 recruits landed in the preceding July, and only 66 out of 1117 old soldiers in this period; yet no regiments on that service were more ably commanded, or better officered than the fusileers and 40th regiment.

Of the classes of society from which soldiers are recruited, I believe it will be found that, cæteris paribus, tradesmen and manufacturers, particularly those from large towns, are soonest swept away by the fatigues and diseases of an army; and that those who have followed agricultural

pursuits are the most healthy. 358 recruits joined the 7th regiment in Portugal, in 1810-11, 201 of them were artificers and manufacturers, and 152 had followed agricultural pursuits. In the course of a few months 122 of the former died, and 62 of the latter; the proportion being 6 out of 10 in the former case, and 4 out of 10 in the latter. In the period antecedent to my arrival in the Peninsula, I understood that this had been one of the most unhealthy regiments in the army.

To whatever quarter the British army may be sent, it is desirable, that corps or recruits should be sent out to it so as to join about the close of a campaign, and when the army is about to get into quarters; this was latterly done as much as possible in the Peninsular army, and with the most manifest advantage; as the corps thus joined were initiated in the habits and mode of living on service, before they entered into its fatigues. On my way from Madrid to Salamanca in August 1812, I met a detachment of the 43d regiment proceeding to join their corps, and I learned that of 300 men landed at Lisbon and immediately sent on to the army, little more than 30 men had got to Madrid, all the rest having either from fatigue or disease been left at the hospitals on their route.

How necessary warm clothing is to the soldier, may be conceived if we reflect how frequently he sleeps in the open air, often in cool nights, and sometimes under dews and night fogs, and how sub-

ject he is to the alternations of heat and cold, the fruitful source of one class of disease. From the nature of the service in which we were engaged, it was not possible to have the men always regularly clothed, though our illustrious commander was never inattentive to this, or to any thing that could conduce to the soldier's comfort. In whatever climate or quarter of the world a regiment is stationed, the yearly supply of clothing for it should be sent out, so as to arrive in due time, and so that the soldier may put it on before the accession of the cold season; that is, before winter sets in in Europe, and by the time the rains set in in tropical countries. The waistcoat is an indispensable part of the clothing of a soldier, and ought never to be omitted. He should have linen trowsers to march in when in a warm climate like that of the Peninsula, reserving the cloth pantaloons for the cold and rainy season. The best clothed were generally among the most healthy regiments.

The health of an army depends in no slender degree, on the quality of the provisions and on the regular supply of them. Some of the divisions of the army appeared to derive a superior degree of health from attention to these circumstances. Some of them were always supplied with abundance of good meat, wholesome wine, and excellent bread; while others complained of their meat, got spirits instead of wine, biscuit instead of bread, or sometimes had neither bread nor biscuit, receiving in lieu of it a portion of flour, or an additional

quantity of meat. It was the duty of the superintending medical officer of a division to see these things, and to report to me whenever they were complained of, or were equal to the production of disease. This was done for my satisfaction: at the same time I must state, that generals of division were usually paternal in their attention to the soldier, as well as most commanding officers of regiments.

If left to himself, the soldier would broil his modicum of meat and eat it at one meal, drinking his allowance of wine or spirits at a draught. It is needless to say, how hurtful this must be to a man undergoing great fatigue and requiring much nutriment. The orders of the Duke of Wellington were, that whether in the field or in quarters, the men should be divided into messes, have regular meals, their meat be well boiled, with a portion of vegetables and salt (whenever they could be procured): and under the inspection of their officers.

With proper arrangement, the soldier may likewise always be regularly supplied with a warm breakfast. If it were possible to issue the rations to the soldier daily, it would be greatly conducive to the preservation of his health. When three days' rations of his provisions are issued to him at once, he frequently consumes or destroys the whole on the 1st day, being two days without any, unless he has an opportunity of plundering.

The efficiency of an army must ever depend upon the state of health of the corps which compose it, and no regiment will be ever found healthy, when the internal œconomy is bad. It is a trite but true observation, that a good commanding officer will generally have a healthy and effective regiment. The system which prevailed in most regiments that served in the Peninsula, ensured a state of health. Wherever there was much attention paid to the discipline and exercise of the men, where they were well fed, personal cleanliness, as well as of their quarters kept up; the men's clothing, if not new, always kept in repair; and the men regularly messed, that regiment was almost invariably found healthy. The temperance, steadiness, and regular habits of the German legion kept them always in a state of health *.

During the last campaigns, and indeed since 1812, the soldiers rarely slept in the open air or were quartered in towns. They were either in huts which they themselves constructed, or they were dispersed in small villages. The huts were speedily constructed, and the tents got up; thus we had it frequently in our power to change the ground of encampment. When the men were in villages they themselves constructed fire-places every where. I have evidence, that the construc-

* The first German Hussars neither lost a man, nor sent one to the general hospitals, during the retreat from Burgos, nor till after the next campaign was opened, and when we were advancing into France.

tion of them in the men's quarters, and particularly in all the buildings appropriated for hospitals, conduced greatly to the men's health. Though it be an object of some consequence, that in the summer and autumnal months, the soldier should march as light and disencumbered as possible; yet in September and October, when dysentery prevails, and thereafter inflammatory diseases, warmth is necessary; and it was recommended that the men's blankets and great coats should be issued to them.

In many parts of Portugal and Spain, particularly in the Alentejo and Estremadura, the quality of the water was very bad, and attention to it was very necessary in making choice of situations for camps or cantonments.

When we came into quarters, indolence and inactivity were not allowed to succeed to the incessant marching and harassing fatigues of the field; but at the same time that discipline was kept up, the amusements of the soldier were encouraged, and he had constant field exercise.

The want of transport was much felt and complained of in the Peninsula; but besides the spring waggons for the conveyance of the sick, I recommended each corps being supplied with a tilted cart. They were thus enabled to aid those slightly ill, by carrying their arms, knapsacks, and occasionally themselves; by giving this assistance to those slightly ill, and the giving medicine on the

earliest complaint of illness*, a very great number of men were thus prevented from going to the rear, and the effective force of the army kept up.

I believe I have now noticed the principal points which in the Peninsular army brought about that extraordinary degree of health which it enjoyed under many disadvantages, during the last year and half it was on that service. I shall conclude by shortly adverting to a few of the most prominent circumstances by which mortality was diminished in our hospitals.

I need say nothing regarding the preservation of cleanliness, ventilation, and other particulars now so well understood every where. I believe that the general hospitals in the Peninsula were in as perfect order as hospitals ever were; and it is but justice to the officers whom I found in the superintendence of them on my arrival in the Peninsula, that I should state my having found several of them in excellent order. Soon after I joined the Peninsular army, I drew out, under the sanction of Lord Wellington, instructions for the medical department; to this I subjoined a pharmacopœia with formulæ, for the use of all the hospitals, general or regimental; compiled chiefly from the

*In what regards the health of its armies, the state should spare no expense in granting freely whatever is conducive to the health of the soldier. Government not only promote in the most effectual manner the objects of war, but of economy, by saving hospital expenditure, leaving humanity out of the question.

communications which I received from the physicians of the army. The whole was printed and distributed to the medical officers.

Sir John Pringle, in enumerating the causes of mortality in the army, has represented hospitals themselves as one of the chief of them; and very justly. It is conformable to all medical experience, that where large bodies of sick are brought together, disease is frequently aggravated, and contagion sometimes generated. I therefore early arranged so that every corps in the army established its own hospital, sending only to the rear, to the general hospitals, severe cases of disease; and these only upon particular occasions. Thus every acute disease was at least in its first stage treated by the regimental surgeon, who never sent away any slight ailments. But it must not be thought, that general hospitals were dispensed with; by no means. In many situations, and always on service, experience has shown me that they are indispensable, and when well regulated they afford the most comforts to the sick soldier, worn down by protracted disease; as in them he has the advice and attendance of the ablest and most experienced medical officers.

Whenever a station was fixed on for a general hospital, it was ordered, that a separate hospital or building should be established for the reception of continued fever, where cases of dysentery might likewise be sent, if they were not numerous, and a separate building could not be obtained for

them. A separate hospital or hospitals were established for surgical cases, where likewise all cases of chronic disease and of intermittent might be placed. A convalescent hospital was established most commonly without the walls of a town; the convalescents being divided into classes according to their degree of convalescence. Those who were convalescent, whether from wounds or disease, were weekly removed from the convalescent wards of the different hospitals, to the convalescent hospital; and no man was sent from the convalescent hospital, till he was judged to be fit for all the duties of a soldier. From the convalescent hospital when fully recovered, a man was sent to the depôt, which was under the charge of a military officer, the commandant; and here, the soldier did some duty, and remained until he was discharged, and sent to join his regiment.

The divisions of the army composed of from eight to fifteen or sixteen regiments, under the command of a lieutenant-general, were each of them under the medical superintendence of an inspectorial officer, to whom the surgeons reported, and who regulated all the medical concerns of the division. It was his duty, to see that, however short a time a battalion or a corps rested in one place, a regimental hospital was established; indeed as they carried with them medicines, bedding, stores, and all the materials of an hospital, a regiment might be said to have its hospital constantly established even on the march. It was frequently

established in the face of an enemy, and nearly within the reach of his guns. When a regiment halted, after getting the men under cover in some building, and constructing chimnies, the first object was to make bedsteads, getting at the same time additional mattresses of straw, rushes, &c. It was really surprising to see with what rapidity this was done; so much were regiments in the habit of it, that latterly, I found the hospitals complete in every thing, and the men most comfortably lodged in a few days after a regiment had halted. In short, by making every corps constantly keep up an establishment for itself, we could prevent the general hospitals being crowded; much severe and acute disease was treated in its early and only curable stage, and no slight wounds or ailments were ever sent off from the regiments; by which means the effective force of the army was kept up, or perhaps increased by several thousand men, and this was effected by the joint exertions of the medical officers who served in the Peninsula; the result of medical science, and their experience of soldiers, their habits, and their aptitude to particular diseases. There was in the Peninsular army throughout the whole medical department, a spirit of energy and devoted zeal for the service, which pervaded the whole as a body, and which is really above all praise.

I must not omit to mention the confidence with which I was honoured, and the uniform support which I received from our illustrious commander

the Duke of Wellington, who confided to me the uncontrouled direction of the department, and of every thing that related to the sick and hospitals.

But as perhaps a chief means, it would be unpardonable in me not to notice in this place the encouragement which was given to the medical department of the Peninsular army by the Duke of Wellington; by cherishing their exertions, and, above all, gratifying them by that public notice and applause which heretofore had been confined to the military department of the army; a notice and applause which brings them on the future pages of the history of their country. Much, very much have I been beholden to the officers of the medical department of the Peninsular army; as I derive from them all the information which I now submit to the Society. I received from them on service, that support and assistance, by which alone, I was enabled to conduct the service, and bring it to a successful termination.

The services of medical officers are of a less brilliant nature than those of the military; but in points of utility, talent, and zeal, I believe it was acknowledged, that the medical was not inferior to any department in the army under the Duke of Wellington, contributing most largely to a successful issue of the contest in which we were engaged.

GENERAL ABSTRACT *of the Admissions, Discharges, and Deaths in the General and Regimental Hospitals in the* PENINSULA, *between the 21st of December, 1811, and the 20th of June, 1814.*

	Remained.	Admitted.	Total treated.	Discharged.	Of which were transferred.	Died.	Remaining.
Remained in General Hospitals the 20th December, 1811.....	4260						
Admitted between the 21st of December, 1811, and the 20th of December, 1812.....		95075		85003	23652	6931	
Admitted between the 21st of December, 1812, and the 20th of December, 1813.....		46715		43189	13964	5267	
Admitted between the 21st of December, 1813, and the 20th of June, 1814.....		22013		22936	4855	2474	
Remaining in General Hospitals.....							2263
General Hospitals.....Total	4260	163803	168063	151128	42471	14672	2263
Regimental Hospitals.....	1978	176067	178045	173544	52571	3841	660
Total	6238	339870	346108	324672	95042	18513	2923

GENERAL ABSTRACT

OF THE

Admissions, Discharges, and Deaths in the Regimental Hospitals in the PENINSULA, from the 21st of December, 1811, to the 20th of June, 1814.

Diseases admitted.	Admitted between the 21st of December, 1811, and the 20th of December, 1812.	Admitted between the 21st of December, 1812, and the 20th of December, 1813.	Admitted between the 21st of December, 1813, and the 20th of June, 1814.	Total.
Remained, December 20, 1811.....				1978
Febris Continua Simp.	16293	18294	5007	40224
Intermittens.....	13759	8203	952	22914
Remittens	1826	1699	436	3961
Typhus.....	331	1309	155	1795
Pneumonia	1604	1481	942	4027
Hepatitis		215	75	290
Rheumatismus.....	2123	2082	728	4933
Ophthalmia	873	745	257	1875
Catarrhus.....		914	638	1552
Dysenteria.....	3241	3420	865	7526
Diarrhœa	6492	6982	2203	15677
Phthisis Pulmonalis...		218	53	271
Syphilis.....	1836	2430	646	4912
Vulnus.....	6214	10108	4564	20886
Ulcera.....	4593	5136	2438	12167
Morbi Chronici.....	120	271	151	542
Varii.....	18688	7879	3878	30445
Punit.	478	1137	455	2070
Total admitted.....	79101	72523	24443	176067
Total treated				178045

Diseases discharged.	Admitted between the 21st of December, 1811, and the 20th of December, 1812.	Admitted between the 21st of December, 1812, and the 20th of December, 1813.	Admitted between the 21st of December, 1813, and the 20th of June, 1814.	Total.
Febris Continua Simp.	16067	17595	5155	38817
Intermittens	13296	8361	1023	22680
Remittens	1802	1641	462	3905
Typhus	261	990	95	1346
Pneumonia	1566	1398	945	3909
Hepatitis		194	76	270
Rheumatismus	2067	2051	750	4868
Ophthalmia	834	764	280	1878
Catarrhus		932	682	1614
Dysenteria	2931	3205	949	7085
Diarrhœa	6300	6897	2452	15649
Phthisis Pulmonalis		166	74	240
Syphilis	1669	2518	643	4830
Vulnus	6032	8462	5437	19931
Ulcera	4329	5083	2489	11901
Morbi Chronici	93	330	125	548
Varii	20254	7468	4251	31973
Punit.	424	1199	477	2100
Total Discharged	77925	69254	26365	173544
Of which were transferred to General Hospitals	28370	16049	8152	52571
Died	776	2371	694	3841
Remaining				660
Diseases of Deceased.				
Febris Continua Simp.	390	942	172	1504
Typhus	62	416	73	551
Remittens	15	48	3	66
Intermittens	16	42	1	59
Hectica		1		1
Cynanche		2		2
Pneumonia	17	68	2	137
Peripneumonia		1		1
Hæmoptysis		1	1	2
Ophthalmia				
Hematemesis		1		1
Peritonitis		1	1	2

Diseases of Deceased.	Admitted between the 21st of December, 1811, and the 20th of December, 1812.	Admitted between the 21st of December, 1812, and the 20th of December, 1813.	Admitted between the 21st of December, 1813, and the 20th of June, 1814.	Total.
Gastritis		1	4	5
Hepatitis	4	16	3	23
Rheumatismus	1	6		7
Enteritis	1	24	4	29
Phrenitis		1		1
Erysipelas		1		1
Hydrocephalus		1	2	3
Phthisis Pulmonalis	10	68	12	90
Carditis	1	4	1	6
Empyema		1		1
Colica		1		1
Hæmorrhagia				
Dysenteria	67	278	86	431
Diarrhœa	5	67	14	86
Hydrops		12	6	18
Asthma		3	2	5
Gangræna		6	1	7
Sphacelus		1		1
Abscessus		1	1	2
Paralysis		1	1	2
Syphilis	3	3		6
Icterus		2		2
Tetanus		3	6	9
Apoplexia	9	15	7	31
Hydrothorax		3		3
Epilepsia		5		5
Vulnera	92	231	183	506
Ulcera		6	2	8
Fractura		4	9	13
Comata		1		1
Mania		1		1
Cholera	2			2
Mortificatio			2	2
Anthrax			1	1
Convulsio			1	1
Synochus			2	2
Catarrhus			2	2
Morbi Chronici	2	11	11	24
Nostalgia		1		1
Variola		1		1
Varii	43	35	26	104
Unknown	36	33	2	71

In 1812, it appears, that in all the hospitals general and regimental, the total treated, excluding French prisoners, but including extra patients, was 176180
Of these discharged cured 119798
Transferred 39757
Died 7193

The Deaths were as follow:

Dysenteria	2340	or 1 in 75¼
Febris Continua	2020	87¼
Typhus	999	176⅔
Vulnera	905	194⅔
Unknown—principally Extra patients	182	968
Febris Intermittens . . .	148	1190½
Morbi Chronici	102	1727⅓
Varii	97	1816⅓
Diarrhœa	79	2230½
Febris Remittens	67	2629½
Pneumonia	58	3037½
Phthisis Pulmonalis	49	3595½
Gangræna	35	5033⅔
Hydrops	26	6776
Syphilis	19	9272⅔
Apoplexia	19	9272⅔
Carditis	6	29363⅓
Ulcus	5	35236
Hydrothorax	5	35236
Hepatitis	5	35236

Enteritis	4 or 1 in	44045
Cholera	4	44045
Epilepsia	3	58726⅔
Tetanus	4	44045
Variola	3	58726⅔
Rheumatismus	2	68090
Cynanche	1	176180
Hæmoptysis	1	176180
Peritonitis	1	176180
Erysipelas	1	176180
Icterus	1	176180
Cancer	1	176180
Hernia	1	176180

Extra patients included in the above.

Remained.	Admitted.	Total treated.	Discharged.	Transferred.	Died.
86	1991	2077	1653	33	182

Prisoners of war not included.

Remained.	Admitted.	Total treated.	Discharged.	Transferred.	Died.
	4234	4234	2866	507	514

In 1813, it appears that in all the hospitals, general and regimental, the total treated, excluding French prisoners, but including extra patients, was 123019
Of these discharged cured 79010
Transferred 29090
Died 6866

The deaths were as follow:

Dysenteria	1629	or 1 in	$75\frac{1}{2}$
Febris Continua	1598		$76\frac{3}{4}$
Vulnera	1095		$112\frac{1}{3}$
Typhus	971		$126\frac{2}{3}$
Gangræna	446		$275\frac{3}{4}$
Phthisis Pulmonalis . . .	158		$778\frac{1}{2}$
Febris Intermittens . . .	139		885
Pneumonia	133		$939\frac{1}{10}$
Diarrhœa	106		$1160\frac{1}{2}$
Hydrops	72		$1708\frac{1}{2}$
Varii	71		$1732\frac{1}{2}$
Febris Remittens	65		$1892\frac{1}{2}$
Unknown	59		2085
Morbi Chronici	58		2121
Enteritis	32		$3844\frac{1}{3}$
Mortificatio	32		$3844\frac{1}{3}$
Hepatitis	23		$5348\frac{1}{3}$
Tetanus	23		$5348\frac{1}{3}$
Apoplexia	21		5858
Ulcera	20		$6152\frac{3}{4}$

Febris Hectica	15	or 1 in 8204¾
Hydrothorax	13	9463
Syphilis	11	11183½
Rheumatismus	11	11183½
Abscessus	8	15377½
Epilepsia	6	20503¼
Fractura	6	20503¼
Asthma	5	24603¾
Sphacelus	5	24603¾
Carditis	4	30754⅔
Paralysis	4	30754¾
Cynanche	3	41006⅓
Icterus	3	41006⅓
Hæmoptysis	2	61509½
Gastritis	2	61509½
Erysipelas	2	61509½
Colica	2	61509½
Hæmorrhagia	2	61509½
Peripneumonia	1	123019
Peritonitis	1	123019
Phrenitis	1	123019
Hydrocephalus	1	123019
Empyema	1	123019
Atrophia	1	123019
Comata	1	123019
Mania	1	123019
Nostalgia	1	123019
Variola	1	123019
Anthrax	1	123019
Hæmatemesis	1	123019
Ophthalmia	1	123019

Extra patients included.

Remained.	Admitted.	Total treated.	Discharged.	Transferred.	Died.
391	1105	1496	1073	99	116

Prisoners of war not included.

Remained.	Admitted.	Total treated.	Discharged.	Transferred.	Died.
347	5651	5998	3420	923	772

In 1814, it appears, that in all the hospitals, general and regimental, the total treated, excluding prisoners of war, but including extra patients, was 53073

Of these discharged cured 34591

Transferred 12825

Died 2909

The Deaths were as follow:

Dysenteria	748	or 1 in $70\frac{3}{4}$
Vulnera	699	$75\frac{3}{4}$
Febris Continua	387	$137\frac{1}{2}$
Typhus	307	$172\frac{3}{4}$
Gangræna	122	435
Pneumonia	96	$552\frac{3}{4}$
Phthisis Pulmonalis	72	737
Fractura	64	829
Varii	35	$1516\frac{1}{3}$
Diarrhœa	34	1561
Tetanus	24	2311
Febris Hectica	23	$2307\frac{1}{2}$

Hydrops	21	or 1 in 2527⅓
Febris Remittens	18	2948½
Apoplexia	16	3317
Hydrothorax	15	3538
Morbi Chronici	15	3538
Hepatitis	8	6634⅛
Abscess	8	6634⅛
Enteritis	7	7581¾
Mortificatio	7	7581¾
Ulcera	6	8845½
Syphilis	5	10616½
Febris Intermittens	4	13243¼
Gastritis	4	13243¼
Asthma	4	13243¼
Paralysis	4	13243¼
Hydrocephalus	3	17691
Synochus	3	17691
Hæmoptysis	2	26536½
Peritonitis	2	26536½
Rheumatismus	2	26536½
Phrenitis	2	26536½
Hæmorrhagia	2	26536½
Icterus	2	26536½
Epilepsia	2	26536½
Scrophula	2	26536½
Catarrhus	2	26536½
Variola	2	26536½
Cynanche	1	53073
Erysipelas	1	53073
Carditis	1	53073
Anthrax	1	53073

Convulsio	1 or 1 in	53073
Splenitis	1	53073
Extra Patients, Diseases unknown	124	428

Extra patients included in the above:

Remained.	Admitted.	Total treated.	Discharged.	Transferred.	Died.
208	2334	2542	2210		149

Prisoners of war not included.

Remained.	Admitted.	Total treated.	Discharged.	Transferred.	Died.
883	1436	2319	1703	182	259

RETURN

OF THE

Number of Deaths which have occurred amongst the Convicts in Portsmouth and Langston Harbours, from January the 1st, 1805, to June the 16th, 1815.

Years.	Number of Deaths in Portsmouth Harbour.	Number of Deaths in Langston Harbour.	REMARKS.
1805	2	4	
1806	15	3	
1807	5	6	The average Number victualled in Portsmouth Harbour was 420, and in Langston Harbour 320, daily.
1808	7	6	
1809	4	3	
1810	4	1	
1811	17	2	
1812	5	2	
1813	8	5	
1814	10	8	
1815	4	4	

J. CARR EMERSON,
Surgeon.

STATEMENTS

OF THE

COMPARATIVE HEALTH

OF THE

BRITISH NAVY,

FROM THE

YEAR 1779 TO THE YEAR 1814,

WITH PROPOSALS FOR ITS FARTHER IMPROVEMENT.

By SIR GILBERT BLANE, Bart. F.R.S.

PHYSICIAN TO THE PRINCE REGENT.

Read June 20, 1815.

THE writer of this article proposes to lay before the Society, an account of the progress and causes of the improved state of health of the British navy, from the period at which France and Spain became parties in the war with the American Colonies, to the year of the general peace, which for a time closed the revolutionary war of France; and to submit certain proposals for the further improvement of the health of this valuable class of men.

Besides the means of information which occurred to him while he was physician to the fleet in the West-Indies and North America, during the

four last years of the American war, and while he was commissioner of sick and wounded seamen, from the year 1795 to the year 1802, he has been furnished, by virtue of an application made in the name of the Society, with materials from the public offices of the navy, all of which most liberally supplied such extracts from their records as were necessary for his purpose.

Some of the most important results of these researches are thrown into the form of Tables, which are inserted at the end of this paper.

It appears from the inspection of the two first of these, that there has been a gradual and great diminution of sickness and mortality in the course of the above-mentioned series of years; as is proved by the numbers received into the hospitals, which must be admitted as a satisfactory criterion of the degree in which sickness prevailed at different periods. But in order to obtain a knowledge of the whole amount of deaths, those which occur on board of ships, as well as those at hospitals, ought to be ascertained. There were no means of collecting them till five years ago, when an instruction under the authority of the Board of Admiralty was promulgated, for all commanders of ships of war to transmit every year, on the first day of January, to the secretary of that office, an account of all the deaths that had happened, of men on board of their respective ships in the course of the preceding

year. These accounts being deposited at the Admiralty, have formed the basis of the following statement*.

There were on board of ships of war in all parts of the world,

On the 1st of January,	1811,	138,581
	1812,	136,778
	1813,	138,324

Died of disease, killed, drowned, &c.

In 1810,	5183
1811,	4265
1812,	4211

From a calculation † founded on *data* furnished

* See more on this subject in the Quarterly Review of this year (1815) under the article of Mr. Colquhoun's Treatise on the Wealth, Power, and Resources of the British Empire, one of the greatest treasures of political and financial knowledge that has been offered to the public in these times.

† As the number of seamen and marines employed in 1813 was double of that in 1779 (see Table I.) the mortality would also have been double, had the intensity of the sickness been equal at these two periods. The deaths therefore in 1813 at the Naval hospitals in all parts of the world, would have been three thousand three hundred and thirteen: instead of nine hundred and seventy, their real number. There was no account taken of the mortality on board of ships in 1779, but it may safely be assumed to bear the same *ratio* to the deaths at hospitals as in 1813; and the deaths on board of ships being calculated on these elements, it will be found that in that year they would amount to three thousand and sixty-seven on the same number of men as in

by this statement and the Tables above referred to, it is deducible that if the navy had been equally sickly in 1813 as it was in 1779, the whole number of deaths from disease in the former year would have exceeded the actual number by 6674; and this is perhaps underrating it, considering the present superior treatment of the sick on board of their ships. Under such an annual waste of life, the national stock of mariners must have been exhausted in the course of the prolonged warfare from which this country has just emerged.

It appears from Table II. that the most sickly years were those of 1779 and 1780. This will be accounted for by referring to Table III. and to the very intelligent and elaborate account of the sickness of these years in Illustration II.

in 1779. But as double * the number of men were employed in 1813, the number of deaths would likewise be double under the like intensity of sickness, and would therefore have amounted to six thousand one hundred and thirty-four: which, added to the deaths at hospitals, give a total of nine thousand four hundred and fifty; and subtracting from this the number that died at hospitals, and on board in 1813, there remain six thousand six hundred and seventy-four, as stated above, for the number of lives that may be said to have been saved this year, when compared to 1779. In making this calculation it has been assumed that the mortality of 1813 on board of ships, is equal to the average of the three preceding years; and only one half of the deaths on board of ships has been reckoned as referrible to disease, there being good reason to believe that the other half is composed of those who have been killed in battle, drowned, or who perished by other accidents.

* See subjoined Illustration I.

subjoined to this article, with which the author was favoured by Dr. Lind, (the worthy son and successor of the author of the Treatise on Sea Scurvy and other works of equal merit,) joint physician with his father at that time to Haslar hospital*. The decrease of sickness since that year has been gradual, with the exceptions of the years 1783, 1796, 1797, and 1804. (see Table II.) The smallness of the number of sick in 1783, was owing to the greater part of that year being a time of peace, for though the greater number of the ships were put out of commission before the end of the year, yet the number of seamen having been voted prospectively the year before on the presumption of hostilities continuing, it was as great† as for a year of war. In the year 1796, the sickness, instead of decreasing gradually, fell *per saltum* as it were (see Table II.) This is satisfactorily accounted for by its being the first year in which the general supply‡ of lemon juice took place. The increase of sickness in 1797, (see Table II.) was owing to the irregularities connected with the alarming mutiny which

* This hospital stands on a point of land adjoining to Spithead, the roadstead near Portsmouth, and the principal rendezvous of the British navy.

† The number voted for 1783 was one hundred and eight thousand, but this measure was not carried into effect, peace having been concluded.

‡ This supply was not at first so general as it became afterwards, for it was afforded only to ships destined for foreign stations or for particular services. The war which broke out this year with Spain interrupted the trade in fruit. It was afterwards very plentifully supplied from Sicily.

broke out in the beginning of that year, and was not suppressed for several months. This serves as a proof how necessary subordination and discipline are to health. The increase of sickness and mortality in 1804 (see Table I.) was owing to the prevalence of the yellow fever in the West-Indies, that year in which the deaths at the hospitals at Jamaica and Antigua amounted to seven hundred and twenty-seven. It appears from Tables I. and II. that there was in that year a great decrease of sickness and mortality on the European stations, which was no doubt owing to the improved methods of preventing typhous fevers. (See Dr. Baird's letter in the subjoined Illustration III.)

The principal diseases which constitute sickness and cause mortality on board of ships in all climates, are scurvy and fevers. To these may be added dysentery, which prevails much in most tropical climates, and above all on the Indian stations. Since these disorders have been subdued in the European stations, pulmonic inflammation has been the most frequent and fatal disease. (See Table V.)

The scurvy *, a disorder incident chiefly to a sea life, but by no means peculiar to it, has been nearly eradicated by lemon juice, or more properly the citric acid; for the juice of limes, Seville oranges, unripe China oranges, and in short of all the species of the botanical *genus citrus*, or the natural

* See subjoined Illustration IV.

order of fruits called *Hesperidæi*, possess the same virtue. The second Table was constructed principally with a view to elucidate the beneficial effects of the general supply of lemon juice. This was known to be a remedy for the scurvy far superior to all others near two hundred years ago, as appears by the writings of Woodall *. It is singular that this important fact should have been hardly known for more than a hundred years † afterwards, when the late Dr. Lind, of Haslar hospital, revived and diffused this valuable piece of knowledge by his writings. It was this author who first clearly ‡ stated the singular powers of this remedy in the cure of scurvy, for Woodall only affirmed that its virtues were far superior to all other remedies. Notwithstanding this, the navy continued to suffer severely from this disease, till the order for a general supply of lemon juice, twenty years ago. This salutary measure was accomplished by a representation from the Medical Board of the navy in the year 1795, during the administration of Earl Spencer, from whose enlarged and benevolent mind every thing was to be expected. One of the most impres-

* His work is entitled " The Surgeon's Mate, or military and domestic Medicine, by John Woodall, master in surgery: London, 1636, p. 165. He concludes his praises of it by saying, " I dare not write how good a sauce it is at meat, lest the chief in the ship should waste it in the great cabin, to save vinegar." See a still earlier testimony in Purchas's Pilgrim, p. 158.

† See the subjoined Illustrations, No. V.

‡ Treatise on the Scurvy, p. 153 & 543. Third Edit. 1772.

sive parts of their argument, was built on the report of the effects of it in the Suffolk of 74 guns*. This ship sailed from England on the second of April 1794, and an experiment was made of supplying her with a quantity of lemon juice sufficient to serve out two-thirds of a liquid ounce every day, to every man on board. This was mixed with their grog, along with two ounces of sugar. She was twenty-three weeks and one day on the passage, without having any communication with the land, and arrived in Madras road, on the 11th of September, without losing a man, with only fifteen men on the sick list, all slight cases, and none of them affected with the scurvy. This disease appeared in a few men in the course of the voyage, but soon disappeared on an increased dose of lemon juice being administered. Let this fact be contrasted with the state of the Channel fleet in 1780 as described by Dr. Lind, (see the subjoined Illustration II.) which was overrun with scurvy and fever, and unable to keep the sea, after a cruise of ten weeks only: and let the state of this fleet be again contrasted with that of the Channel fleet in 1800, as described in the subjoined Illustration III. by Dr. Baird, which, by being duly supplied with lemon juice, kept the sea for four months without fresh provisions, and without being affected with scurvy.

* See more concerning the first general supply of lemon juice, in Observations on the Diseases of Seamen, p. 490. Ed. 3. by Gilbert Blane, M.D. Lond. 1799.

It appears from the inspection of Table II.* that during the nine years of war preceding the general supply of lemon juice, the annual average of sick sent to hospitals, was one in 3.9 of the whole men in the navy, but that in the nine succeeding years, the proportion was one in 8.4. Other causes, particularly the improved methods by which fevers were diminished, contributed greatly to this decrease of sickness, so that it may be difficult to assign precisely what is due to lemon juice. But what admits of no ambiguity, is that, ever since the year 1796, scurvy has almost disappeared from ships of war, and naval hospitals. It will be seen from the subjoined copy of the printed form of returns, Table V. that scurvy is not even inserted there, as one of the heads of disease. One of the physicians of Haslar hospital has informed the author that he has seen but one case of it there, for the last seven years; and one of the physicians to Plymouth hospital reports, that only two cases have occurred to him the last four years. It will be seen, by comparing Table IV., with which the author was favoured by Dr. Wilson, one of the physicians to Plymouth hospital, with the like Table of Haslar hospital, at the interval of twenty-six years, what great changes there have been in that time in the number and quality of

* The author was furnished with this Table, by Dr. Harness, the medical commissioner of the Transport Board, who afforded every facility to the Society in the examination of the records of the medical branch of that office.

diseases, and particularly in the decrease of scurvy. It is found by the inspection of a great number of surgeons' journals, which the Society has been permitted to make, that ever since the supply of this article, the scurvy has either not appeared at all even on the longest voyages and cruises; or if ever it did in a slight degree, it was soon made to disappear by an additional dose of lemon juice. The daily regulated allowance for each man is now one fluid ounce, with an ounce and a half of sugar. It appears also from the same journals, to be favourable to health in other respects; for some of the surgeons have given it as their opinion, that it tends to diminish the number of fevers and ulcers. The latter are observed to be much connected with a scorbutic habit. It is true that there are instances of ulcers prevailing on board of ships, in their most aggravated state, since the introduction of lemon juice, but without any connection with scurvy, and it was confined to particular ships and hospitals in which they were infectious*. The increased attention to ventilation and cleanliness has since removed this evil, than which there was none more cruel to individuals, nor more embarrassing to the service.

Those only who have made themselves acquainted with the early part of the naval history of this country, or those who have perused the

* See Observations on the Diseases of Seamen, p. 503. 3d edition.

interesting, popular and eloquent narrative of Commodore Anson's voyage, in which the distresses and calamities, the dreadful sufferings and mortality arising from the sea scurvy are depicted, can duly appreciate the value of this simple remedy. The power it possesses over this disease is peculiar and exclusive, when compared to all other alleged remedies. It is *sui generis—Nil simile nec secundum.* Its efficacy may also be stated as singular when compared to that of any other remedy in any other disease. It is a certain preventive as well as cure: no other remedy yet known can ward off this dreadful scourge of mariners for an indefinite length of time under the use of salt provisions; nor does it produce any bad effects on the constitution like some other specifics in certain other maladies. It may therefore be affirmed with truth that it performs not only what no other remedy will perform in this disease, but what no known remedy will effect in any known disease whatever *.

There are some other species of fruit and vegetable acids, also saccharine substances in every form, and fermenting beverages which have considerable power in retarding the progress of this disorder for a limited time, but will not cure it under the use of salt provisions. A vegetable substance called nopal, the stalk of the *cactus opuntia*,

* The author has never seen the scurvy resist the citric acid, and in the perusal of several hundreds of surgeons' journals, he has met with only two cases which seemed to resist it.

which keeps well at sea, has been lately discovered in India to be an extremely salutary article of diet, and to resist scurvy; but the author read in the surgeon's journal of one of the East-India Company's ships, that in spite of the use of this, and of spruce beer at the same time, sixteen cases of scurvy arose, in one of which it was so severe as to prove fatal. All the mineral acids have been tried without effect. Had the peculiar virtue of citric acid been attended to when Commodore Anson fitted out the Centurion, and had a few gallons of it been sent on board of this ship in glass bottles, with a tenth part of spirits of wine to preserve it, all the misery which fills the reader of this narrative with so much commiseration and horror, and which was on the point of frustrating the object of the expedition, would have been prevented *.

* Anson's ship the Centurion left England with 400 men: there were 200 surviving on her arrival at Juan Fernandez, of whom only eight were capable of duty. In a very few days there would not have been strength remaining to carry the ship to her anchorage, and she would have been left adrift on the Pacific Ocean, in the same manner as the Oriflamma, a Spanish ship on her passage from Manilla to Acapulca, some time in the last century, in which the whole crew perished from disease, and in this state she was discovered with the dead bodies on board. This is a voyage of six months, being made against the trade winds. The ships employed in this service have of late years been perfectly healthy, by being abundantly supplied with the citric fruits. The author owes this information to Capt. Mendoza y Rios, to whom navigation is so deeply indebted for the incomparable Nautical Tables which he has constructed, and which he is still farther improving. Anson sailed from St. Catharine's the 28th

The liberal supply of fresh provisions and vegetables, with which ships have been furnished while in port, during the late war, has also contributed much to counteract the scurvy, for formerly this disease was not confined to long voyages and cruises. It appears from Dr. Lind's statement, that one thousand four hundred and fifty-seven men ill of scurvy were sent to the hospital from the Channel fleet in 1780, and it has been known to arise in ships while at anchor under the daily use of small-beer. Nay, it has been known to arise among prisoners of war living entirely on fresh diet, and solely imputable therefore to confinement in bad air, a dull uniformity of life, depression of spirits, and indolent habits naturally belonging to a state of captivity. This happened at Portchester Castle and Norman Cross towards the beginning of the revolutionary war, before those arrangements were put in practice, which afterwards so effectually secured their health. The like happened about the same time in a prison ship adjoining to Portchester Castle, but it was remarked to break out sooner, and to a greater degree in the ship than in the castle *.

28th of January 1741, and arrived at Juan Fernandez the 10th of June following, so that he was one hundred and forty-three days from the last place of refreshment, whereas the Suffolk was one hundred and sixty-two days under the like circumstances without losing a man, and without having any man ill of scurvy, or any other dangerous disease on her arrival in India.

* See also a curious instance of scurvy arising at land under the use of fresh provisions, in an article by Sir James Macgrigor, in

The year 1796 may therefore be considered as an era in the history of the health of the navy. But there appears * to have been another sudden decrease of sickness in the first years of this century. This is to be ascribed to the improvements in the method of promoting ventilation and cleanliness, and particularly to the strict discipline † adopted and inforced in the Channel fleet. Air contaminated by foul and stagnant exhalations, particularly those from the living human body, is the ascertained cause of typhous fever, known also by the name of the jail, hospital and ship fever, which has been a more grievous and general source of sickness and mortality in the navy, than even the scurvy. The dysentery, which stands next in order in point of fatality, is also generated and propagated by the want of cleanliness and ventilation.

The infection of fever is generated by the breath and perspiration of men, crowded for a length of time in confined air, and without the means of personal cleanliness, particularly from the want of

in the Med. and Surg. Journal of Edinburgh for 1805, page 282; also in the Trans. of the Coll. of Phys. Vol. II. and IV. and Trans. of this Society, Vol. IV. page 141. It appears from Pliny, that this disease affected also the Roman armies in Germany. There is reason to believe that the scurvy will not arise in any circumstances under the use of fresh animal food, provided fresh vegetables are used at the same time. Farinaceous food, though of a vegetable nature, will not have the same effect.

* See Tables I. and II.

† See the letter from Dr. Baird in the subjoined Illustration III.

shifts of linen. The methods which have of late been practised with such decided success, in combating these evils on board of ships have chiefly been;

First: Regulations respecting personal cleanliness. A frequent inspection is made of men's clothing, to ascertain whether there is a sufficiency for the purpose of cleanliness, and of protection from cold: the regular washing of apparel is enforced, and two sets of hammocks are provided, in order that one may be scowered while the other is in use. It is greatly to be lamented that the want of a regular and adequate supply of soap is still a bar to these measures being carried into due effect, nor is it easy to account for the omission of a supply of such obvious and great utility, and of which the expense would be manifoldly compensated by the improved health of the men.

The chief source of infection used to arise from the method in which new raised men were treated, by being crowded on board of small tenders and receiving ships, for a length of time before they were distributed to their respective ships. The alarming state of sickness in the American war, induced the Navy Board, over which Lord Barham then presided, to institute, in 1781, what were called *slop ships**, on board of which new raised men were conveyed, in order to be

* Slop is a trivial name for the various articles of seamen's clothing, such as jackets, shirts, and trowsers.

inspected, cleaned, and supplied with new clothing before being distributed, and to be conveyed to their ships not in small tenders as formerly, but in large men of war*. It was owing to the want of such regulations that the navy used to be most lamentably infested with fevers at the commencement of wars, from the manner in which impressed men were treated, and it is from a change of system in this respect that we are to account for the great difference in sickness in the year 1794, the first year of the revolutionary war, from that in 1779, in the great armaments on occasion of the war with France, Spain and the Colonies. (See Table II.)

Secondly: The improvements in the ventilation, cleanness and dryness of ships. The want of cleanness will hardly produce disease, unless when combined with want of ventilation. What are called wind-sails, that is, wide tubes formed of canvas, and extended by hoops into the form of a cylinder, which pass from the external air into the lower parts of the ship, through the hatches, have been in use time out of mind, for freshening the spaces between decks. But these are very imperfect ventilators, for they cannot be let down in

* On the 13th of March 1787, the House of Commons called for an account of the impressed men who had died in the course of the American war, before being distributed to ships. The number returned was 180, as taken by the author from the original document deposited at the Journal-office of that House.

bad weather when the hatches must be shut, at which time they are most wanted. They also admit such large volumes of cold air, that they cannot with safety be introduced to those spaces where the men are asleep. In order to obviate these imperfections, it has been common for the last thirty years to put in practice a contrivance borrowed from a French frigate*, consisting of square wooden trunks, for which brass tubes have since been substituted, running from the hold or lower deck and terminating in the open air. Instead of air tubes in this situation, it has of late been judged more adviseable to place a funnel vertically, near the middle line of the ship before the fore-mast, leading through the forecastle deck. All ships are now fitted in this manner, and the great importance of it will be obvious, when it is recollected that in this deck there is neither hatchway nor ladder, and that the sleeping places are under it.—The removal of all offensive substances by sweeping and scraping, has been much more accurately attended to than formerly; but the washing of decks, particularly in cold and damp weather, has been much less practised. On the contrary, dryness, so essential to health and comfort, has been more studied, and rubbing with hot sand, scraping and portable fires have been found much more salutary operations, than frequent washing. Though there seems little to fear with respect to health from

* See Diseases of Seamen, p. 266. Ed. 3.

the exhalations of pure water, whether salt or fresh, yet there can be no doubt of the bad effects of the diffusion of moisture in circumstances where it cannot be readily dried up, for it promotes mouldiness, putridity or rust in the several perishable objects with which it comes in contact. Dryness therefore is deservedly held to be a matter of primary consideration in the economy of a ship, as well with a view to health and comfort, as to the preservation of all the valuable articles of victualling, clothing, utensils and arms. It is essentially promoted by portable fires carried all over the ship, when most wanted, in iron stoves, which have been much in use for this purpose for some years. The use of iron, now so general in all the implements and machinery subservient to human life, is also employed for various uses on board of ships. It was about two and thirty years ago, that fireplaces of cast iron were first introduced in room of the brick-work, of which they were formerly constructed, and there is another application of iron, still more recent and important, which now falls to be mentioned.

One of the most prolific sources of foul air and bad smells in ships has been the putrescent matters absorbed and retained by gravel, sand, and other earthy substances, heretofore used for ballast. It is now found that these can be dispensed with, having been superseded by a recent invention, now coming into general use. Some part of the ballast

has at all times consisted of small masses or pigs of iron, but at present little else is used expressly for that purpose, what is farther required to give the requisite steadiness to the ship, being made up by the weight of the iron tanks now substituted for the lower tier of water-casks, and placed over the iron ballast. These vessels are cubes of four feet in dimensions, each of them capable of containing about two tons of water. This invention has in other respects a beneficial influence on health. Iron not being corruptible like wood, imparts no bad quality to the water, and by its durability ensures a more certain and ample supply; for the utmost distress has been known to arise from the decay of casks on long voyages and in remote parts of the world, where they cannot be replaced. The quantity that can be laid in at once in fitting out is also more abundant, than could be done by means of casks, a point of great importance to health on long voyages and cruises. A great deal of dangerous labour is also saved by this substitution; for these tanks are never removed, being filled and emptied by means of a forcing pump and a hose; whereas the hoisting up of casks from the hold at sea was one of the hardest and most dangerous duties of seamen, while it was also injurious to health, being performed in the midst of foul air. It has been truly remarked, that seamen are affected with ruptures* above the proportion of men

* The following account of the supply of trusses for the navy will convey an idea of this. During the last eight years, the average

in general; and next to the violent pressure made on the abdomen, while seamen are lying on the yards, in the act of handing and reefing sails, such accidents may be chiefly imputed to the severe strains to which men are exposed in removing water casks from the hold for daily use at sea. The play of the machinery also employed in this operation has given occasion to severe and dangerous accidents.

Under the head of late improvements, conducive to the purity of air in ships, there falls to be mentioned another very recent and very important invention which has been adopted in their construction. This improvement was suggested and put in practice by Mr. Seppings, surveyor of the navy, and has been explained by him in the Philosophical Transactions for 1814. The purpose of the contrivance is to add to the strength, solidity and durability of ships, and it is effected by the obliquity of the materials, and by filling up certain intervals and cavities with pieces of wood, caulked and pitched. It would be out of place here to enter into the merits of this plan, except in so far as relates to health, to which it is incidentally and collaterally condu-

average annual supply of trusses has been two thousand eight hundred and seventy-three single trusses, seven hundred and forty-three double trusses, and in the course of the last three years, ninety-eight bag trusses have been supplied to the navy. The trusses now preferred are those called *self-adjusting*, as they have been found to afford greater security than those formerly in use, to men employed in hard labour, who from their exertions and postures would be liable to a recurrence of the complaint.

cive in a variety of ways. First, By the obliteration of those cavities under the floor of the hold which used to be the receptacles of filth and of all manner of vermin dead and alive, proving perpetual reservoirs and sources of foul air and of offensive and noxious exhalations. Secondly, There is a circumstance in this form of construction still more favourable, if possible, to the purity and freshness of the air in the lower parts of the ship, so as in a great measure to supersede all other methods of ventilation. This consists of certain intervals left between the timbers of the frame which run up the sides of the ship, maintaining a constant communication of the open air with the hold and the spaces between decks. Thirdly, By virtue of this construction also a ship becomes less liable to leakage; so that by this and the new method of ballasting, all the unwholesomeness and offensiveness belonging to bilge water is done away: and it will appear hardly credible to succeeding generations, that the air in the well of a ship should become so contaminated, as in innumerable instances to produce instantaneous and irremediable suffocation. Two instances occurred to the author's own observation. Two ships of 74 guns, fitted in this manner, have lately returned from sea to be paid off; and it appears from their medical journals, that they have reaped every advantage with regard to health that could be wished or expected. The Albion, in the course of eleven months, during three of which she was engaged in winter cruises on the coast of America, the most rough and

trying service in the world both for ships and men, had on an average no more than five on the sick list of a crew of 490 men; no infectious disorder arose; the only deaths from disease were one from pulmonic inflammation, which was by far the most prevailing complaint, and one from erysipelas; twelve were sent to the hospital, none of which were cases of fever, flux or scurvy. Of this small number, the only serious cases were those of small-pox, consumption, and pulmonic inflammation. This ship was also fitted with iron tanks. The Tremendous, in the course of twenty-two months, employed chiefly in the North Sea, had no case of fever, flux, or scurvy, and only two deaths happened, one from pulmonic inflammation, and one from inflammation of the liver; nor did any infectious disorder arise, except the mumps * (*cynanche parotidea*), of which there were sixteen cases: the great majority of complaints were catarrhs: twelve were sent to hospitals, of which the only important cases were those of anasarca and pulmonic inflammation.

In reviewing the various ways in which these new methods of fitting ships of war affect health, it is truly pleasing to contemplate that admirable harmony by which every thing that is most perfect and excellent in subjects of art, as in the arrange-

* It is not uncommon for this complaint to spread in ships of war. See Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. III. p. 431.

ments of nature, tend in all their bearings and influences to bring about the most salutary ends.

There is still another recent contrivance, which, though much less important, is in proof of the same principle, and is deserving of notice, as well from its having some influence on the purity of the air, as to demonstrate how much the human intellect is awakened and exercised in this age and country in all manner of useful inventions. What is alluded to, is the illuminators, or bull's eyes, as they are vulgarly called, consisting of thick portions of glass, in form of the segment of a sphere, inserted in the ports and decks for the admission of light in bad weather, when all the inlets of light and air are barred up. They afford great accommodation, particularly to small ships in the day-time, by superseding the use of candles, which are dangerous from the risk of fire, and tend to contaminate the air, already too close and foul.

There are some other points conducive to health in the present arrangements of the navy, which remain to be adverted to. The chief of these are the superior and excellent quality of all the articles of victualling; the plentiful supply of fresh meat and vegetables, while ships are in port, or within reach of it, as in the fleet stationed off Brest; the supply of as much wine as is equivalent to one half of the allowance of spirits; the use of cocoa for breakfast; and the general practice of vaccination.

The only head of improvement still remaining to be added to the enumeration in the present system of conducting the navy with regard to health, is the superior treatment of the sick. In the course of the last twenty years, the supply of medicines, and of the several articles of nourishment, has been greatly improved in quantity, quality and selection: there has also since that time been appropriated to the sick a supply of bedding and other necessary articles conducive to cleanliness and comfort, and essential to their recovery. These arrangements began about twenty years ago, and have been gradually improved upon by the zeal, humanity and good judgment of the officers, civil, military, and medical, attached to the sea-service. A great improvement has been made in the situation, fitting and furniture of the *sick berth*, as it is called. The spot appropriated to the sick in ships of the line was formerly in the fore part of the lower gun-deck, a situation damp, ill-aired and inconvenient. Its place is now under the forecastle, furnished with all the requisites of an hospital, and with access to the head for necessary purposes. There are now therefore ample means of treating the diseases and wounds of men on board of their own ships, whether at sea or in harbour, which it was neither safe nor practicable to do in former times, when infection was rife; when the accommodations were unfavourable to recovery; when the supply of medicines and necessaries was inadequate;

and when there was a deficiency of medical and chirurgical skill.

It is from this that we can trace the late increased ratio of mortality at the hospitals, as appears in Table I. No slight cases are now sent to the hospitals as formerly, such cases being retained and cured on board: there are now no cases of scurvy, all of which, except such as were in the last extremities, or were complicated with other complaints, recovered at the hospital*. The sea service has also profited no doubt by the generally improved state of physic and surgery, and the encouragement so judiciously and liberally afforded to the medical service of the navy, under the administration of the late Lord Melville, by additional pay and the gratuitous supply of all the medicines†, which cannot fail to have attracted candidates of superior talents and education.

The causes of the improved state of health of the British navy appear therefore to consist in the ample and general supply of lemon juice, the su-

* It ought farther to be remarked, in justice to those who have the charge of these institutions, in order to account still more satisfactorily for this late increased proportion of mortality, that it has not been the practice for some years past as formerly, to lodge the invalids in the hospitals on their arrival from abroad.

† Surgeons formerly found all their own medicines. A gratuitous supply of the principal medicines was directed in 1796, and an entire supply of them in 1804.

perior attention to cleanness, dryness and ventilation, the improvement in victualling, vaccination and superior medical treatment.

The moral effect of all these ought not to be overlooked. The encouragement administered to men's minds by kind treatment, and the anxious desire of officers to supply all their wants in sickness and in health, while they prove an inducement for good men to enter the service, cannot fail to add to that alacrity and spirit so favourable to health, and which have produced results in the course of the last twenty years, which will be proudly recorded in the annals of the country. And by a reverberated influence as it were, the contemplation of these great events, the fruits of successful valour, beget an elevation of mind still farther conducive to the sound state of the body, while it exalts and confirms those sentiments of patriotism and loyalty, which, backed by discipline and martial ardor, have so eminently distinguished our fleets and armies in the late contest. And we hope it will be admitted that the medical art has contributed its due share towards those resources by which this country has been saved, and Europe delivered in the late war, a war unexampled in its duration, extent and violence; and not less remarkable for the momentousness of the interests at stake, and the arduousness of the struggle, than it will be memorable for the final and complete success with which it has been crowned.

Much praise is due to the government of the country, and to the officers of the navy, for bringing about these salutary changes. It does not appear from the history of ancient times, nor of modern times till very lately, that the means of preserving the health of those engaged in war, whether by land or sea, was either studied or understood. We hear little or nothing of the medical establishments in war, among the polished* nations of antiquity, nor in the early history of Christendom; far less are they to be expected among barbarous nations, whether ancient or modern. It must however appear clear to every reflecting mind, that the care of the sick and wounded, is a matter equally of policy, humanity and economy. Independently of men being sentient beings and fellow-creatures, they may also be considered as indispensable mechanical instruments. But in former times they had not the attention paid to them, which would have been due even to inanimate machines of equal utility; for there seem-

* Xenophon, Cæsar, and Polybius, who give the most minute details of war, make no mention of hospitals for the entertainment of the sick and wounded; nor does Vegetius, in his Treatise on the Art of War, ever touch upon this subject, but one of his commentators mentions, that each Roman legion (between three and four thousand men) had one medical officer attached to it, and that Augustus Cæsar, in compliment to the profession, and in gratitude to his physician Antonius Musa, under whose care he had recovered from a severe illness, decreed that these officers should in future be exempted from military duty. Vid. Vegetii de Re Militari, l. ii. Godescalci Stewechii Commentarius.

ed to be much more anxiety about preserving arms from rusting, and cordage from rotting, than about maintaining men in an effective state of health*. This cannot be asserted with regard to the sentiments and practices of the present officers of the navy, among whom there prevail enlightened and comprehensive conceptions of duty, arising out of a general diffusion of zeal, intelligence and humanity; which, seconded by the like qualities in the civil authorities and the medical officers, has carried the health of the navy to a pitch, which the most sanguine well-wisher to the public welfare would not have ventured to predict five and thirty years ago.

The result of this has been not only to afford a great additional number of effective hands towards the accomplishment of those great ends for which navies are created and destined, namely, public defence, and the annoyance of the enemy, not to mention that naval renown of which as a nation we are so justly proud, but to promote economy to a degree which will appear incredible to those who have not paid close attention to this subject. It is computed that two ships of war are capable of more service by the present system, than three of the same rate in former times. Here is a saving of one third of the total amount of the national ex-

* There was no article in the public instructions issued to naval commanders, respecting ventilation and cleanliness, till the edition promulgated in 1806.

penditure, besides what is saved in the recruiting service, which has been officially calculated to amount to fifteen pounds for each man, and of hospital expenses which are estimated at five pounds for each man. This computation is exclusive of the higher bounties which would have been necessary under the reduced stock of seamen, which a high rate of mortality would have produced. Nay, it appears clear from what has been before stated, that if the mortality during the twenty years of the revolutionary war had been equal to what it was in 1779, the whole stock of seamen would have been exhausted; in which case men would not have been procurable by any bounties however exorbitant; for it has been stated that if the mortality of 1813 had been equal to that of 1779, there would have died annually six thousand, six hundred and seventy-four men more than have actually died: which in twenty years would have amounted to 135,480, a number very nearly equal to the whole* number of seamen and marines employed in the last years of the late war.

It must not be concealed, however, that the present rate of mortality of the navy, low as it is compared to what it was formerly, is very high when compared to that of subjects of the same age, in other situations of life. It will be found by calculations founded on the statement at page 492,

* See page 492. et seq.

that the average rate of mortality for the three last years of late war has been one in 30.25. This is a high rate for men of an age from twenty to forty years, of whom the great majority of seamen and marines consist. The Northampton Tables give a mortality of one in fifty-seven in this class of subjects, and these were constructed at a time when the general rate of mortality in England was greater than at present. From a computation founded on the experience of the last forty years, in the Equitable Assurance Office *, it appears that the mortality of persons at this age does not exceed one in one hundred and thirty. This calculation, however, is made on select cases, none but good lives being insured. From the best computation that can be made, the mortality in this class in the general population of England, is about one half the mortality of all ages, and this being one in forty-nine, according to the population returns of 1811, the mortality of subjects from twenty to forty ought to be one in ninety-eight; but as the decrease of mortality seems to be chiefly in infants (certainly so in the metropolis), and as consumptions have been observed to be more frequent of late among young adults, probably from a greater number of sickly children being saved, this rate of mortality is perhaps too low: it cannot be far wide of the truth, if we take it at one in eighty. But, be this as it may, one in thirty is a very high rate of mortality; especially

* Mr. Morgan, the very diligent and scientific actuary of this office, was so kind as to furnish the author with this information.

when it is considered that they are in some measure select cases, no sickly or unsound persons being admitted into the navy. In order, however, to make the comparison still more fair, a deduction of those who are killed in battle, or perish by drowning or other accidents inseparable from a life at sea, should be made from the naval deaths. There is good reason to believe that these violent deaths constitute one half of the mortality on board of ships of war. This will reduce the mortality from disease, to one half of what was stated. But on the other hand, in order to make a just calculation of the total rate of mortality, the deaths at hospitals ought to be included. In the year in question, 1813, the deaths at hospitals in all parts of the world amounted to nine hundred and seventy-seven. (See Table I.) These being added to the deaths on board from disease, and the number of men employed in that year being divided by the sum, the total mortality will appear to be one in forty-two, which is about double of that of subjects of the same age in civil life. It is greater than even that of prisoners * of war, which in 1813 was one in fifty-five; as appears by an account extracted from the public returns. It is also higher than that of the garrison of Gibraltar †, which is one in forty-nine, exclusive of the years in which the epidemic fever prevailed.

* See subjoined Illustration VI.

† See Vol. V. of these Transactions, p. 334.

It is a matter deserving of serious consideration, therefore, how far it is possible to improve still farther the health of seamen. The air at sea is more pure and salubrious than any where else. Nature therefore has done much, and as there is abundant proof of the power of art to controul the causes of disease, there is great encouragement in attempting something further in behalf of the health and lives of this most valuable class of subjects.

In order to effect this, it will be necessary to ascertain clearly what are the principal causes of disease, still existing in the navy.

From the examination of surgeons' journals, and hospital returns, it appears that the chief sources of mortality in the navy of late years have been pulmonic inflammation and fevers in temperate climates, and fevers and dysenteries in tropical climates. By the returns of the hospitals at home, a specimen of which is exhibited in Tables IV and V, it appears that pulmonic inflammation constitutes the largest head of mortality. This will farther appear very striking by comparing the proportion of pulmonic cases in the late returns of Haslar and Plymouth Hospitals, and Dr. Wilson's enumeration of diseases, with that in Dr. Lind's statement in 1780. These late cases are chiefly pulmonic consumptions, the *sequelæ* of pulmonic inflammation which had occurred at sea. The chief circumstance in a seaman's duty which exposes him to this inflammation, is his

being suddenly called from the too warm and close situation in which he sleeps, to take his watch in the night upon deck, or aloft. As this has always been the case, it may be asked how it happens that such complaints have been more frequent of late. The most rational answer to this seems to be, that, as the constitutions of seamen are now entirely free from scorbutic taint, and in a great measure from the debilitating influence of febrile poison, more sound and vigorous also from improved diet, cleanliness and ventilation, and at all times breathing a bracing atmosphere, are more prone to diseases of pure inflammation than formerly. In illustration of the superior purity of cool air being favourable to pulmonic inflammation, it may be alleged that the inhabitants of Swisserland, Savoy, and Sweden, are remarked to be more liable to these than the rest of Europe. If we were to reason farther upon it, an explanation might also be derived from that principle of the animal economy, by which it is found that the presence of one disease is in a great degree incompatible with the existence of another. Whatever the cause may be, the fact is undoubted. With regard to fevers, they are by no means subdued to the same degree that scurvy has been. In some of the last years of the late war, there occur in the surgeons' journals some examples of fever being generated and propagated in ships, to a great extent. In a 90 gun-ship, cruising in the channel in 1805, there occurred a hundred and seventeen cases of fever, five of which proved fatal. Intem-

perance also is occasionally unavoidable, particularly in port. In an 80 gun-ship which had been for some time at Plymouth in 1806, during which the men had indulged to excess, in spirituous liquors, a fever broke out on her first going to sea, with which a hundred and six men were seized, of whom ten died. Such excesses are still more pernicious in tropical climates, and this, combined with other causes, has in the late war been productive of the most dreadful mortality. It appears, for example, from the first Table, that in the year 1804, while there was a high degree of health in the navy in Europe, there was an extraordinary loss of lives from disease in the West-Indies.

It remains to point out the means of counteracting these very serious evils. And first, with regard to pulmonic inflammation, which has been imputed to the too great heat and closeness of the places in which the men sleep, whereby they are generally in a state of perspiration when called into the open air, the utmost benefit would arise from rendering those spaces cooler. This should be done so as to avoid streams of cold air, which could easily be managed by the construction and due distribution of air-pipes, such as have been already described. But when Mr. Sepping's construction shall be universally carried into practice, no other provision for this purpose will be necessary. The extreme of cold ought equally to be avoided during sleep. Many pulmonic affections are caught by men fall-

ing asleep in the open air, on their watch. Proper clothing, particularly the wearing of flannel next the skin in cold climates and seasons, is an essential precaution against such inflammations, and it is almost unnecessary to mention that men should be induced, when practicable, to shift their clothes when wet, as one of the most material precautions against catarrhal affections, with which pulmonic inflammation generally commences.

Secondly. With regard to typhous fevers, it is plain that the well ascertained methods of preventing them, admit of a still higher degree of practical energy. It is also evident that no degree of discipline nor internal œconomy can prevent or destroy morbid *effluvia*, and ensure the purity of air in a ship, till Mr. Sepping's improved construction and the new method of ballasting shall become general; nor till an ample and regular supply of soap shall be furnished. With regard to this last article, it is quite unaccountable how any thing so obvious should have been so long overlooked. The only conceivable objection is the expense that would be incurred. This could be obviated by its being supplied in the manner of slops and tobacco, that is, charged against the seamen's wages. But were it to be supplied at the expense of the state, it would be an inadequate statement and a narrow view of its benefits to say, that there would be a tenfold pecuniary saving in the tear and wear of men. Seamen are frequently not only censured but

punished for want of personal cleanliness, in circumstances in which they are without the means of practising it: for on foreign stations there is not every where a market, and if there were, seamen are generally in want of money to purchase it, no part of their wages being payable abroad. When this supply shall be granted, of which there can be no doubt in this humane and enlightened age, one half of it should consist of that sort of soap which is made with a double proportion of soda or barilla, as it answers remarkably well for scowering coarse articles with sea-water.

Thirdly. With regard to intemperance, naval officers are so fully persuaded of its baneful tendency, that no exhortation on this subject seems necessary. It is only to be wished that the possibility of abusing spirituous liquors were removed, this form of fermented liquors being more adverse to health than any other, and from the comparative smallness of their volume, their abuse is more easy, and their concealment less liable to detection. Much benefit is derivable from the late practice of substituting an equivalent in wine, for one half of the spirits; and still better effects have been experienced from an entire supply of wine *, to the exclusion of spirits. Intoxication not only renders men ineffective while under its influence, but ruins their constitutions, excites and predisposes to fevers, and gives occasion to various mechanical injuries of the most serious

* See a very striking example of an entire supply of wine, in Observations on the Diseases of Seamen, pages 51 and 83. 3d Edit.

nature and tendency. The great proportion of maniacs * among seamen is chiefly owing to injuries of the head, received in a state of intoxication, as might be naturally expected where the brain is already in a state of disturbance.

Tea is an article universally grateful to the British population, and has to a certain degree supplanted intoxicating liquors, in all ranks, to the great advantage of society. It would be wise therefore to encourage the farther use of it in the navy, there being no solid objection to the salubrity of it. To those who declaim against its supposed relaxing property, it may be answered by asking whether British courage and hardihood appear in the late exploits by sea and land less splendid than at Cressy or La Hogue, whether there is to be found in the results of the battles of Trafalgar and Waterloo, any proof of British nerves being unbraced by the habitual use of this beverage, and whether the physical and moral energies of our officers and men will not stand a comparison with those of their forefathers or of their enemies, neither of whom were drinkers of tea.

Fourthly. A great proportion of the mortality of the navy, are referable to the diseases peculiar to tropical climates, particularly in the West-Indies. Yet there are incontrovertible proofs, that fleets may serve on this station in a state of health, equal to that of any other part of the world. In the

* See subjoined Illustration VII.

month of April 1782, in a fleet of thirty-eight ships of the line and three frigates, manned with twenty-three thousand men, the deaths from disease were, of fevers, fifteen; of dysentery, seven; of scurvy, two; of small-pox, six; of mortification, one; of consumption, one; of general debility, one; in all thirty-three, and only ninety-seven were sent to hospitals. After the celebrated battle of the 12th of that month, the whole of this fleet rendezvoused at Port Royal, in Jamaica, and the greater part of it remained at anchor there during the following month of June. During this month, in thirty-two ships of the line and one frigate, there died of fever, an hundred and thirty-four; of dysentery, fifteen; of scurvy, none; of various other complaints, six; in all, an hundred and fifty-five. Not quite an hundred were sent to hospitals, and the majority of these were cases of fever. The mortality, therefore, was more than four times greater than it was to windward, which was chiefly owing to the following causes:—first, The watering duty, on which the men caught the bilious remittent, or endemic fever of the climate; secondly, The clearing and fitting of the French prizes then in an extremely filthy state, from which they caught the yellow, or contagious fever (*typhus icteroides*). The writer finds, on consulting the notes which he then kept as physician to the fleet, that he first perceived the contagious nature of this fever, from observing, that those men who caught the fever, or were taken ill after returning to their own ships,

by having been exposed to the foul air of the French ships, communicated it to their medical and other attendants*: thirdly, The greater facility of procuring spirituous liquors, for intoxication, particularly with this species of fermented liquor, renders the body much more susceptible from all the causes of fever.

But the mortality of seamen in the West-Indies during the American war was trifling, when compared with what it has been at different times in the course of the late revolutionary war. It appears by records kept at the Admiralty, that the naval force in the West-Indies in 1804, fluctuated from nine thousand to thirteen thousand in ships of all classes; whereas in 1782, in which there was a greater naval force under Lord Rodney than there had ever been before or has been since on any foreign station, the strength of this armament fluctuated from twenty-four to twenty-five thousand men. Yet on casting our eye on Table I. it appears that there died more in the hospitals of the West-Indies in 1804 than in 1782. This statement is still stronger, when it is considered, that those who died of wounds are included in the amount of deaths in 1782; whereas, in 1804, there was no action at sea. The mortality, therefore, was about

* This subject is well illustrated by Mr. Pym, Deputy Inspector of hospitals, in a work entitled Observations on the Bulam Fever. London, 1815.

three times greater in the latter than in the former period. It appears from the surgeons' journals on that station at that time, that there was a proportional mortality on board of ships. In one frigate, there were one hundred and seventy cases of fever, of which twenty-six proved fatal on board.

In order to recommend measures of future precaution, let us, if possible, detect the causes of this very great difference of sickness and mortality at different periods on the same station.

It is observable, that the mortality in fleets in the West-Indies, has been by far most severe in those wars in which there were great expeditions by land, as in that against Carthagena in 1740, and those against Martinique and St. Domingo in the first years of the revolutionary war. There was no large army transported from England, nor any expedition of importance undertaken during the three years in which Lord Rodney commanded in the West-Indies. It is to this we trace the great difference in point of health at different periods. The vessels that used to be hired for transports, were for the most part very ill adapted to that service, generally over crowded; and during their long passages, in consequence of contrary winds and other obstacles, almost all of them arrived in the West-Indies in a sickly state, from stale provisions and scarcity of water; but above all from accumulated infection. When the typhous poison exists in a

slight degree, a warm climate dissipates it; but when in a concentrated state, it is exasperated by the heat of the atmosphere, and by the paludal exhalations which universally exist in the vicinity of West-India harbours: and it has been matter of observation that troops which were disembarked from the most crowded and infected of the transports, were those men who, though they had escaped illness on the passage, were attacked soonest and most malignantly by the fever of the climate. It ought also to be remarked, that the causes affecting the health of the troops in 1795 and 1796, were greatly aggravated by a fever then prevailing, generated in a ship which arrived in the islands in May 1793, under peculiar circumstances of long protracted crowding and foul air. And it may here be farther remarked, that malignant febrile infection has probably been kept up by being imported from time to time in slave ships, during those ages in which this traffick existed, the circumstances in the middle passage being such as were likely to generate contagion. The evils connected with the conveyance of troops have in a good measure been avoided by the attention of the Transport Board, in making better regulations; but more particularly by the employment of ships of war for transports *. This was eminently exemplified in the expedition to Egypt in 1798; for many of the troops, from various

* See a luminous exposition of the advantages of employing King's ships in the transport service; in the speech of the late Lord Melville, in parliamentary debates for May, 1810.

causes of delay and change of destination, were six months on board of ships, yet disembarked at the Nile, in perfect health. The obvious remedy of the very serious evils from the old system of transports*, is the observance of those rules of ventilation and cleanness, which have been already amply described and dwelt upon.

The other principal cause of sickness in the West-Indies, is the going on shore, whether for the purpose of wooding or watering, whereby they are at all times exposed to the endemial *miasmata*, or for any other purpose, whereby they may mix with the population, and inhale the morbid human effluvia, during those times in which epidemic fevers prevail. All such duties should be performed† by hired negroes, against which there can be no conceivable objection; but an economy demonstrably false, if there is any truth in the general scope of what has been said on this subject. It appears clearly from several incidents connected with the lamentable mortality in the West-Indies in the end of last century, and the beginning of this, that mortal diseases were contracted by seamen, not only by the wooding and watering duties, but simply by going on shore to the sea-port towns where infection existed: for ships have

* See subjoined Illustration VIII.

† The author has learnt since this went to press, that this has been practised for some years at Jamaica, with every advantage that could be wished.

been known to be exposed to the atmospheric heats of Africa, and other tropical regions, with impunity; but upon arriving at a port in the West-Indies, and some of the men going on shore, the most fatal epidemic immediately broke out*.

The only other remark that remains to be made on this subject is, that the abuse of spirituous liquors is vastly more pernicious in that climate than in cold and temperate climates. One main cause of the unexampled health of the fleet to windward in 1782, was the extraordinary vigilance exercised in precluding all access to this poisonous cordial. The admiral carried this so far as to send armed parties round that district of St. Lucia which lies adjacent to Gros-islet Bay, where the fleet lay at anchor, with orders to break all the stills that could be found, the island being then under martial law.

Fifthly. The last means to be proposed for farther promoting the health of seamen, is a more ample supply of articles of nourishment for the sick and convalescent. It is not enough that they be supplied with such small messes of refreshment as are fitting and necessary for a sick bed: the list of articles already provided is well selected, and sufficient for this purpose; but there are still wanting the materials of adequate and substantial diet,

* There are striking examples of this in the journals of the Amelia and the Arab frigates, in the years 1804—1807.

adapted chiefly to convalescents. It may be answered that the portable soup answers this description; but this has never been a popular article of nourishment among seamen, nor is it sufficiently hearty, solid, or abundant for the purpose of recruiting strength. There is a new method of preserving fresh provisions not only in an uncorrupted state, but with their sound and natural flavour for several years, which has stood the most satisfactory test of experience, and is well known to many officers of the navy as an article of sea-store. This method * was invented and brought into use a few years ago by Mr. Appert. A quantity of provisions preserved in this manner sufficient for the sick and convalescent, might be furnished at a very moderate expense, and the form of preparation is so simple, that such a compendious and cheap method of managing it on a large scale, will probably be fallen upon, as to render it occasionally available to the whole of a ship's company.

The means proposed for the farther improve-

* The method is as follows; The meat is put into a pot, the bones being first removed to be boiled in the ordinary way. When it is about three fourths boiled, it is taken out and put into jars, which are filled up with broth made from other portions of the same meat. The jars are then corked, luted, and put into bags; they are next placed in a boiler of cold water, heat is applied till the water boils, and the boiling temperature is kept up for an hour; the fire is then extinguished, the water drawn off from the boiler, and the bottles or jars taken out, which completes the process.

ment of the health of the navy, are therefore the taking of measures for the prevention of pulmonic inflammation, farther attention to ventilation, cleanliness, and temperance, the hindering of men from going on shore in the West-Indies, and the providing of a better diet for the sick and convalescent. Other minor particulars might be enumerated, such as the baking of soft bread on board of ships, which is quite practicable *, and besides the superior salubrity of it over biscuit, the more commodious stowage of flour is a great recommendation.

Whatever has been said with respect to the health of the navy, will apply to ships employed in commerce, but not in the same degree; for in order to man the guns on board of a ship of war, there are three times as many men including marines, as would be required merely for the purpose of navigating. Trading vessels therefore are not equally liable to the bad effects of crowding. Next to the Royal navy, the Marine of the East-India Company merits attention as a great public concern. The Directors of that Company very liberally permitted the members of this Society to examine their medical records. It appears that there was an allowance of lemon juice in the service, long before it was supplied to the King's ships, but the author was informed by the late Dr. John Hunter,

* See Diseases of Seamen, pp. 138 and 284. Third Ed.

physician to the East-India Company, that the supply was neither sufficiently ample nor good in quality. Since the practical proofs of its utility in the Royal Navy have become manifest, an adequate stock of good lemon juice has been supplied for the use of the mariners of the East-India ships, and of the troops conveyed in them, and with the same salutary effects. These ships not being so full of men as ships of war, fevers are not so apt to arise; and there being no crowded transports nor slave ships belonging to this service, it is from these circumstances that we can partly account for our Eastern Settlements not being subject to malignant fevers like the Western: I say partly, for with respect to endemial diseases, there are tendencies of particular spots and regions of the earth to particular disorders, which are quite inexplicable in our present state of knowledge. For instance, none of the ports of the Bay of Bengal are so subject to malignant fevers as the West-India harbours, though the creeks adjoining to the Delta of the Ganges are apparently similar. Batavia is the only port in that quarter of the world which can be compared to the Antilles in this respect. The swelled leg of Barbadoes and Cochin, and the *goitres* of certain mountainous districts, may serve as another example of the like local and unaccountable peculiarities. Dysentery and liver complaints, by a like peculiarity, are by far the most frequent and fatal disorders among seamen in India. The dysentery is probably owing to the

vitiated and acrimonious secretions of the liver; this organ being much more liable to disease in India, at sea as well as at land, than on the Charibean stations. It is remarked in one of their surgeon's journals, that upon inspecting the body of some of those who had died of dysentery, he found abscesses in the livers of most of them. Early bleeding when the strength will bear it, a free use of calomel, and purging salts, and the discreet use of opium, were found the most efficacious remedies. It is a great advantage in this service, that the military forces are not conveyed in crowded transports, as on the expeditions to the West-Indies. The soldiers are very judiciously distributed in small detachments in the India ships, and it does not appear that on any occasion the deleterious poison of typhous fever has ever been generated in the aggravated degree in which it has appeared in other quarters of the world; and this is no doubt one reason why the several presidencies of India have not been visited with the same dreadful scourge as our West-India settlements; though the atmospheric heat is considerably more intense in the former, particularly in the presidency of Madras.

It is therefore highly satisfactory to contemplate the many proofs of substantial benefits that have accrued to the sea service in the last forty years, both in war and commerce, in all quarters of the world, from the zeal, humanity, and good judgment displayed in promoting the health of seamen. It has

been proved that it has added at least one third to the national force, and therefore subtracted in the same proportion from the national expenditure. It may be alleged by those who are disposed to question this position, that it is not by the improvement of health alone that ships are enabled to keep the sea at all seasons, and in all climates for an indefinite length of time. This is certainly true, for the sheathing with copper besides adding to the speed of ships has proved of incalculable benefit by superseding the necessity of frequent repairs, whereby much time used to be wasted in harbours. In the year 1779 there were no ships of the line coppered except four, composing the squadron which Lord Rodney carried to the West-Indies, and the Bedford of 74 guns. In the year 1782, the whole British navy was coppered. It may farther be alleged that by means of the recent discoveries in astronomy and mechanics, ships are enabled to keep the sea in prosecution of long cruises and voyages, whether for the purpose of war, commerce, or geographical science, without losing time and incurring danger by making land for the purpose of correcting longitude. All this is admitted. But these considerations are so far from disparaging the benefits of health, that they give it additional importance, for it is manifest that without the supply of lemon juice, and the other means of maintaining health for a sufficient length of time, the advantages of copper sheeting, the facilities in finding the longitude by chronometers, telescopes

and astronomical tables, which do so much honour to the human intellect, particularly to the age and country in which we live, would be in a great measure frustrated. It would be of little avail that the depths of mathematical science, the elaborate researches of mechanical, optical and chemical* philosophy, should be called to the aid of navigation, so as to co-operate so admirably in carrying it to its present exalted state of perfection, unless the means of preserving health were to keep pace with these mighty improvements. And on a review of this subject in all its extent and relations it will appear that there is not probably to be found in the whole range of human affairs, a finer illustration of the practical benefits of progressive knowledge in promoting the great interests of mankind; so that science, while it lends an aid, also sheds a grace and dignity over the useful arts; nor can there be a more striking proof of the maxim, that humanity, like every other moral virtue, is the best policy; nor could we light on a more happy example to elucidate that subsidiary influence and mutual dependence by which all the arts, sciences, and professions have a reciprocal bearing on each other, conspiring to bring about the greatest sum of human enjoyment, and affording a field of contemplation, in which cultivated, benevolent and pious minds delight to expatiate.

* See subjoined Illustration IX.

TABLE I.

ABSTRACT of the Number of Seamen and Marines voted by Parliament for the Services of the Years 1779, 1782, 1794, 1804 *and* 1813 *respectively, shewing the Numbers sent Sick to Hospitals, and Discharged therefrom, with the Numbers who Died therein in each respective Year, on the different Stations at Home and Abroad.*

	Sent Sick.	Discharged.	Dead.	Run.
In 1779, 70,000 men voted.				
Home Station. Haslar.	15141	11712	807	523
Home Station. Plymouth.	6799	5736	174	96
Home Station. Small Ports.	2286	4333	183	149
West Indies	3846	2425	467	221
East Indies				
Mediterranean	520	420	27	8
	28592	24676	1658	997
Proportion to the Number voted	1 in 2.45		1 in 42	
Proportion to the Sick			1 in 17	
In 1782, 100,000 men voted.				
Home Station. Haslar.	9103	7054	513	122
Home Station. Plymouth.	4784	3813	136	21
Home Station. Small Ports.	9022	9974	447	483
West Indies	5104	3502	753	342
East Indies	2810	1251	337	21
Mediterranean	794	696	36	4
	31617	26290	2222	993
Proportion to the Number voted	1 in 3.2		1 in 45	
Proportion to the Sick			1 in 14.25	

	Sent Sick.	Discharged.	Dead.	Run.
In 1794, 85,000 Men voted.				
Home Station. Haslar.	8949	7206	496	226
Home Station. Plymouth.	4237	3790	164	17
Home Station. Small Ports.	6062	7360	162	257
West Indies	733	525	58	32
East Indies	254	165	13	8
Mediterranean	1138	857	97	23
	21373	19903	990	563
Proportion to the Number voted	1 in 4		1 in 86	
Proportion to the Sick			1 in 21.6	
In 1804, 100,000 Men voted.				
Home Station. Haslar.	1667	1251	140	2
Home Station. Plymouth.	3888	3205	282	15
Home Station. Small Ports.	2095	2187	203	28
West Indies	3215	2095	825	149
East Indies	932	592	105	17
Mediterranean	181	118	51	3
	11978	9448	1606	214
Proportion to the Number voted	1 in 8.33		1 in 62.25	
Proportion to the Sick			1 in 7.5	
In 1813, 140,000 Men voted.				
Home Station. Haslar.	3592	3014	212	1
Home Station. Plymouth.	3563	2948	231	3
Home Station. Small Ports.	2578	1868	243	3
West Indies	2392	2212	179	6
East Indies	462	392	72	
Mediterranean	484	478	40	
	13071	10912	977	13
Proportion to the Number voted	1 in 10.75		1 in 143	
Proportion to the Sick			1 in 13.33	

TABLE II.

Shewing the Number of Seamen, including Marines, annually voted by Parliament, for two distinct and equal Portions of War, with the Number annually sent sick on Shore, and to Hospital Ships on the Home Stations, during those Periods.

Years.	Number of Seamen.	
	Voted by Parliament.	Sent Sick.
1778	* 60,000	15,978
1779	70,000	24,226
1780	85,000	32,121
1781	90,000	23,812
1782	100,000	22,909
1783	110,000	13,577
1793	45,000	17,280
1794	85,000	19,248
1795	100,000	20,579
	745,000	189,730
1796	110,000	16,860
1797	120,000	20,544
1798	120,000	15,713
1799	120,000	14,608
1800	111,538	17,747
1801	131,538	15,082
1804	100,000	7,650
1805	120,000	8,083
1806	† 120,000	7,662
	1,053,076	123,949

* It may be remarked with regard to this and the preceding table, that the numbers voted being greater than the number actually employed, the inferences are not accurate. But these statements being comparative, the justness of the inferences will depend on the relative, and not the absolute number. Whoever wishes greater precision, may learn what abatement should be made from the number voted, by inspecting the statement in page 492, from which it appears that it is about one forty-seventh part.

† See Illustration I.

TABLE III.

Diseases admitted into the Royal Hospital at Haslar, in 1780.

Under the Physician's Care.		Under the Surgeon's Care.	
Continued Fevers	5539	Cutaneous Disorders	165
Intermittent Fevers	33	Venereal Disease	183
Small-pox	42	Ulcers, including Wounds and Abscesses	979
Measles	28	Fistula in Ano	8
Anginæ	3	Fistula in Perinæo	12
Pleurisy and Peripneumony	13	Burns	4
Asthma	61	Ruptures	3
Cough, Pain of Side, and Hæmoptoe	40	Disorders of the Testicles	16
Consumption	218	Contusions and Injuries of the Head	31
Rheumatism	327	Contusions of the Trunk and Limbs	102
Lumbago	4	Œdema of the Leg or Arm	4
Palsy	9	Luxations	8
Epilepsy	19	Fractures	60
Jaundice	1	Erysipelas	12
Dropsy	24	Ophthalmia and Disorders of the Eyes	17
Scurvy	1457	Affections of the Urinary Organs	8
Scrophula	4	Amputations and Sundry Cases of Lameness	32
Mania	16	Total Surgical Cases	1678
Headache and Vertigo	3		
Disorders of the Eyes	2		
——— of the Ears	5		
——— of the Abdominal Viscera	3		
Cholic	1		
Flux	240		
Disorders of the Bladder	16		
Gravel	32		
Hæmorrhoids	2		
Epistaxis	1		
Total Physical Cases	8140		

In 1780 Physical Cases	8140
——— Surgical Cases	1678
Total	9818

Mem. In the above enumeration, out of the whole number of patients only 221 cases in making the collection have been omitted. The net number received into Haslar that year, was 10,839.

TABLE IV.

A Statement of the Diseases and Number of Patients admitted into the ROYAL NAVAL HOSPITAL at Plymouth, under the Care of one of the Physicians on that Establishment, in the Years 1806, 1807, 1808, and 1809; together with the Number of Deaths in each Year, during that Period.

DISEASE.	1806 No.		1807 No.		1808 No.		1809 No.	
	Rec^{d}	Died.	Rec^{d}	Died.	Rec^{d}	Died.	Rec^{d}	Died.
Fever	180	37	72	14	76	16	219	22
Pneumonia	39	15	73	14	76	46	58	5
Asthma	7		10	1	20	1	9	
Catarrh	33		12	1	5		12	
Phthisis	94	27	57	33	83	25	74	32
Rheumatism	59	2	39	1	50	1	47	1
Vertigo	2		1		2		2	
Epilepsy	15		3		13		3	
Mental Derangement	23		15		16		7	
Apoplexy	2	1	1				1	1
Phrenitis								1
Paralysis	5	2	2		7		10	
Diarrhœa	8	1	6	1	12	3	9	
Dysentery	15	4	12	2	13	4	43	11
Hepatitis	10	2	11	1	17		12	1
Icterus	2	1	4	1	1		3	
Enteritis	1		2		1			
Gastritis			1		1			
Cystitis			1		1			
Peritonitis			2		1		1	
Nephritis					1		1	
Dyspepsia	3		5		9		4	
Dropsy	9	2	8	3	9	4	15	5
Debility	34	3	19	1	34	6	20	4
Gout	4				1			
	545	97	356	73	449	106	550	83

DISEASE.	1806 No.		1807 No.		1808 No.		1809 No.	
	Rec^{d}	Died.	Rec^{d}	Died.	Rec^{d}	Died.	Rec^{d}	Died.
Brought forward ...	545	97	356	73	449	106	550	83
Hæmorrhois.....	2		1		1		1	
Lepra	2		1		1		1	
Colica			2	2	1		1	1
Tympanitis	1		2		2		4	
Cynanche.....			2		2		4	
Scarlatina.....			3				3	
Erysipelas	1			1	2		1	
Constipatio	1				1	1		
Chorea			1					
Cholera			2		1		1	1
Diseased Stomach.			1					
Incontinence of Urine	1		1		1		3	
Cephalalgia	1		1		1			
Scrofula	2		1		1			
Tetanus.....	1				1	1		
Hæmatemesis			2	1				
Scurvy	1		1					
Diseased Intestines....	1		2	1	1			
Hypochondria					1		1	
Gravel.....	1						1	
Worms.....					1		1	
Palpitatio Cordis	1		1		1		1	
	561	97	380	78	468	108	573	85

TABLE V.

ABSTRACT of MEDICAL REPORTS for the Months of January, May, and October, 1808, *and January, May, and October,* 1814.

	MONTHS.	ROYAL HOSPITAL AT HASLAR.						ROYAL HOSPITAL AT PLYMOUTH.					
		Number now in the Hospital.	Received.	Discharged cured.	Died.	Invalided. Harbour Duty.	Invalided. Unserviceable.	Number now in the Hospital.	Received.	Discharged cured.	Died.	Invalided. Harbour duty.	Invalided. Unserviceable.
Fever.	Jan. 1808	25	25	15	4			9	14	7	2	1	
	May.....	11	17	15	3			13	25	16	6		1
	October..	3	4	4	2			5	9	3	2		
	Jan. 1814	32	24	15	2			15	15	18	1		
	May.....	43	51	22				70	74	19	3		
	October..	17	13	14				7	10	14	1		
Dysentery.	Jan. 1808	9	10	13	2			4	2	1			
	May.....	4	6	1	1				1	1			
	October..	26	40	23	4			1	2	2			
	Jan. 1814	13	11	7	2			3	4	2			
	May.....	4	5	2	2			2	2	1			
	October..	13	12	22	2			3	4	2			
Pulmonic Inflammation.	Jan. 1808	38	37	14	5		4	36	34	5	6	4	5
	May.....	72	84	50	13		1	58	94	54	21		
	October..	25	28	23	3		5	2	2	2	5		1
	Jan. 1814	111	83	36	7	4	6	11	10	23	1		
	May.....	83	77	68	7		8	17	21	8	2		
	October..	51	35	49	10			18	22	11			

	MONTHS.	ROYAL HOSPITAL AT HASLAR.						ROYAL HOSPITAL AT PLYMOUTH.					
		Number now in the Hospital.	Received.	Discharged cured.	Died.	Invalided. Harbour Duty.	Invalided. Unserviceable.	Number now in the Hospital.	Received.	Discharged cured.	Died.	Invalided. Harbour duty.	Invalided. Unserviceable.
Ulcers.	Jan. 1808	124	44	32	1	2	6	41	23	4	1	1	1
	May.....	62	18	31			7	80	53	14			2
	October..	79	26	20	1	2	11	28	5	12		1	4
	Jan. 1814	68	29	18			5	51	19	17			
	May.....	36	14	17			6	29	15	17			9
	October..	60	26	24				51	35	11			10
Wounds and Accidents.	Jan. 1808	21	14	4		1	6	22	16	7	1		
	May.....	15	8	8	1	1	6	39	12	10		1	1
	October..	14	7	2			1	15	7	4			2
	Jan. 1814	29	11	6	2		7	56	21	7	1		7
	May.....	32	23	16			8	64	53	11	1		50
	October..	57	33	20	1		1	29	21	9	2		17
Other Complaints.	Jan. 1808	99	49	33	3	2	7	141	72	34	2	5	8
	May.....	81	62	27	6	3	15	163	116	49	7	1	24
	October..	92	60	24	5		6	99	59	52	3	9	16
	Jan. 1814	168	104	65	6	3	14	206	106	84	13	2	21
	May.....	102	87	82	8		10	260	217	102	7		74
	October..	141	76	56	3		7	216	120	101	9		24

TABLE VI.

Account of the Lunatic Officers, Seamen, and Marines, sent to Hoxton House, and variously disposed of for the last five years of the late war.

Year.	Received.	Discharged cured.	Discharged to their friends and otherwise.	Discharged to Bethlem	Died.	Remaining on the 31st of December each year.
1809	76	10	3	43	9	112
1810	81	15	1	38	20	118
1811	85	4	3	53	16	128
1812	90	10		39	18	144
1813	93	17	7	55	13	140*
Total	425	56	14	228	76	

* Including the following officers, one captain, four lieutenants of the navy; three lieutenants of marines; one surgeon, one assistant surgeon, two carpenters, one gunner, one master's mate, one midshipman.

ILLUSTRATIONS.

I.

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The gradual increase of the navy since the 16th century, may be learnt from historical records. It appears that in the reign of Queen Elizabeth, the navy, at the time of the Spanish armada, was manned by four thousand and eighty-eight mariners, six hundred and eighteen gunners, and one thousand five hundred and twenty-four soldiers, in all six thousand two hundred and thirty; not a twentieth part of the naval force at the end of the late war: that the number of seamen and marines in the year of the battle of La Hogue, 1692, was thirty thousand: that during the whole course of the first and second succession wars, (the former terminating in the peace of Utrecht, the latter in the peace of Aix-la-Chapelle,) it was forty thousand: that in the beginning of the seven years' war, it was fifty thousand, and rose to seventy thousand at the accession of his present Majesty; this increase having been made on occasion of the family compact of the House of Bourbon, and continued till the peace of 1763. The numbers in the American War, and the late war, have been stated in the preceding

tables. The great superiority of the late naval force will appear in a still stronger light, when it is considered that from the new methods of preserving the health of men, and of equipping ships; two ships are more than equivalent to three in point of efficient service.

II.

Page 493.

Extract of a letter from Dr. John Lind, late physician to Haslar Hospital.

The annexed state of Haslar Hospital in the year 1780, will shew the diseases to which the Royal Navy on the first equipment of fleets was then liable; and by comparing it with any statements you may obtain of it in the last war, will enable you to appreciate the effects of the improvements which have been since introduced into the navy, in correcting disease. On the 26th of October, 1778, the fleet under Admiral Keppel came into port, and before the end of December, sent three thousand six hundred sick to Haslar. This hospital contained one thousand eight hundred beds, of which one-fourth (four hundred and eighty) were in garret wards, suited only for convalescents, and restricted to about one-third the cubic space allowed for ventilation to beds in the

regular wards; to receive this number of patients three hundred additional beds were placed in the lobbies to the garret wards, and many other places not before destined for patients. From this you will be able to account for its appearing in your reports from the Transport Office, that the succeeding year 1779 commenced with two thousand two hundred and seventeen patients in the hospital. What, under the severe pressure of circumstances, was adopted as a temporary measure, was afterwards during the war acted upon as a permanent provision. In proportion as this receded from the regular establishment, the recoveries became fewer and more tedious. In 1779, on the return of the Channel Fleet, under Sir Charles Hardy, into port, it became sickly; two thousand five hundred were in the month of September received into hospitals from it, and above one thousand ill of fevers remained on board for want of room in the hospitals. On this occasion the prison hospital at Forton was added to the relief of Haslar, and accommodated more than two hundred patients; it continued in this employ till the succeeding autumn, when an influx of sick prisoners recalled it to its original destination. Within four months preceding the year, of whose diseases I am to state the account, six thousand and sixty-four sick had been sent to Haslar; and at the commencement of the year there were two thousand four hundred and forty-three patients in the hospitals. Early this year a convalescent ship,

the Mars, in which the patients, for the sake of holding a greater number, lay in hammocks instead of cradles, was added to the hospital establishment; and I may state, next year another convalescent ship, the Lioness, was joined to this, the former holding four hundred, the latter two hundred men. Some relief, though comparatively but a small one, had been obtained from private quarters throughout these difficulties.

The preceding account gives the cases of patients received into the hospital during the third year of the war. Strong infection had continued during the former years on board the receiving ships, which affected the ships fitting out, and generally the fleets on coming from sea into port; and a fleet of unusual magnitude, to which, in common with every department at the port, the hospital was disproportionate, from the strength of the enemy's combined fleets rendering it imprudent to divide, had remained collected at Spithead during a great part of the winter. The effect of this extended through the five first months of this year, and there was not afterwards experienced during the war any such fatal sickness.

Five thousand five hundred and thirty-nine cases of fever were admitted this year, of which three thousand seven hundred and fifty-five, or above two-thirds, were admitted in the first five months. The proportion of deaths to the general admissions

into the hospital, was during that period as one to eight; during the remaining seven months as one to nineteen. During the above five months also six hundred and ninety-seven died, being above two-thirds of the whole number of deaths (nine hundred and eighty-seven) which occurred that year in the hospital. Thirteen cases of pleurisy and peripneumony appear in the account; but during spring many others occurred combined with the prevailing fever.

One thousand four hundred and fifty-seven cases of scurvy are noted. This is the only instance that occurred of the channel fleet being in any considerable degree affected with this disease. In August after a ten weeks' cruise in the Bay of Biscay, when the beer and all fresh provisions had been exhausted, Admiral Geary's fleet returned to Portsmouth with two thousand four hundred men ill of the scurvy. Many of these were cured without being sent to the hospital, of whom some were landed and lodged in tents, others were allowed to walk in the fields through the day and return at night to their ships. Some had died on board, and two or three died in landing, otherwise this disorder proved fatal only in one or two exhausted cases.

Two hundred and forty fluxes were admitted. They were chiefly of a chronic nature, and in patients returned from abroad.

The proportion of fevers admitted this year was less than it had been during the two former years, and therefore the proportion of other diseases increased: it amounted this year to little more than two-thirds of all the other physical cases, and the proportion of physical cases was nearly five-sixths of all the patients admitted.

Of one thousand six hundred and seventy-eight surgical cases admitted, nine hundred and seventy-nine, or much above one-half had ulcers, including a few cases of wounds and abscess.

The gross number of admissions and deaths this year, as appearing by the agent's books were admissions eleven thousand seven hundred and thirty-two, and deaths nine hundred and nine, being in the proportion of one death to thirteen admissions.

After this period the Channel fleet became more healthy, and Haslar was not so much exposed to fevers. The state of the war which had before always required it to winter in a body at Spithead, then admitted of it being separated during winter, and divided between Portsmouth and Plymouth.

Besides the sick here enumerated, many scorbutics were sent on shore from ships who were taken care of by their own people, and no account of them was taken at the hospital.

III.

Pages 495, 497, 503.

London, the 8th of July, 1815.

DEAR SIR,

I discover by referring to the log-books of ships of the Channel fleet, under the command of the Earl of St. Vincent, that the fleet sailed from Torbay on the 27th of May, and returned to the same anchorage on the 26th of September 1800, when out of 24 sail of the line, frigates, fire-ships, &c., composing the number returned to that road-stead, we had occasion to send only sixteen patients to an hospital.

During the above cruise the fleet had not one *fresh beef* dinner, and so strictly was the station off Brest preserved, that out of a hundred and twenty-one days, one only passed without communicating with the advanced post lying in the outer road of Brest Harbour, and the commander-in-chief ascertaining the enemy's force and position. This was a mode of cruising until then unknown, and utterly unpractised on that coast, but was then of vital importance to this country, as the French army, under the command of General Augereau, was embarked on board the French fleet, and waiting an opportunity of making their escape, the destination supposed to be Ireland, that country being then in a state of great commotion. At the very beginning of the

cruise, scurvy made its appearance, but by a timely supply of lemon juice was soon subdued. It was during this cruise that the commander-in-chief devoted himself most particularly to that system of improvement in the detail of the fleet, which has subsequently by its adoption diffused health through the British navy in all climates, viz. the establishment of a sick berth, the excellent arrangement in ships' store-rooms, by which ventilation is produced, cleanliness of men's persons, cleaning of decks remote from ventilation by dry rubbing, correcting damp and foul air by burning fires, introducing seamen's dress suitable to the climate, airing beds and bedding twice a week when the weather would admit of it, &c. &c.; and of such consequence was the latter practice considered by the commander-in-chief, that he required a regular insertion of it in the ship's log, so that any deviation from this order in detached ships was liable to detection on rejoining the fleet. The introduction of these most salutary regulations so *entirely* belong to the Earl of St. Vincent, that hundreds of officers of the first character can attest, and the impartial historian record the same. No longer do we hear of ship fever laying up ships of the line, and their services lost to the country for many months at a time.

I am, dear Sir,

Very faithfully yours,

A. BAIRD.

IV.

Page 495.

The abuse of words has been truly stated by philosophers as one of the chief means of impeding the improvement and retarding the progress of useful knowledge. This cannot be better illustrated than by the perverted application of the term *scurvy*. Eugalenus, a German physician, in the beginning of the seventeenth century, laboured to prove that the scurvy properly so called, almost all the forms of cutaneous complaints, hypochondria and various other maladies ought to be considered as one disease, and treated accordingly. As he wrote in a confident and dogmatic tone, in bold and specious language, he was followed by most of the eminent writers of the seventeenth and beginning of the eighteenth century, particularly Boerhaave and Willis, whose works abound with the most puerile and absurd conceits on this subject. There would have been little harm in this folly, had they not built upon it a most incongruous and pernicious system of practice*. Kramer, who was physician to the im-

* The following sentiment of Dr. Lind on this subject is as well conceived as happily expressed. "There would indeed be some difficulty in conceiving how men of such wild fancies as were they who have been deemed the principal authors on the scurvy, and to whom we are indebted for this general name, should get into possession of that degree of fame which they have acquired, did we not perceive how much the world is disposed to admire whatever surprises; as if we were endowed with faculties to

perial armies in Hungary from 1720 to 1730, relates that of four hundred men labouring under genuine scurvy, treated by one of the medical officers with mercury, so as to excite salivation, in conformity to the doctrines of his master Boerhaave, not one survived. This, though deeply mortifying to medical systems, is highly instructive, as an exhortation to study the rules of legitimate reasoning, the habit of discrimination, and the definite use of terms, while it ought to serve as a warning against the danger of idle speculations, gratuitous assumptions and perverted language, so abhorrent to the simplicity and modesty of truth and nature. And has it not been chiefly owing to the attention being engrossed by scholastic sophistry and jargon, that the world was deprived for near two centuries of the practical benefits of the citric acid in scurvy? This discovery, the legitimate offspring of experience and observation, was overlaid as it were, and nearly stifled by that spurious mass of presumptuous error and systematic dullness, which constituted so large a proportion of what was miscalled Medical Science, in the 17th and great part of the 18th century.

to see through ordinary follies, while great absurdities strike us with an astonishment which overwhelms the powers of reason, and makes improbability even an additional motive to belief." It would appear that there are medical, as well as religious heresies and superstitions. This passage from Dr. Lind, relating to some of the fathers of modern physic, must remind every general reader of a parallel passage in one of the ancient fathers of the church.—*Credo quia absurdum—credo quia impossible!*

V.

Page 496.

As a proof how much and how long this useful discovery was overlooked, it may be mentioned, that in the year 1753, a Fellow of the College of Physicians, and an eminent practitioner of that day, published a tract on the Sea Scurvy, in which he never adverts to the superior virtue of this medicine; and when the College was consulted on this subject by the government, they recommended chiefly vinegar, (see Mead's Works) which has been found by modern experience to possess but little power over this disease. Mead approves of this answer, and recommends also elixir of vitriol, which was supplied gratuitously to navy surgeons for many years. But though this mineral acid seems to palliate some of the symptoms, such as the hemorrhages, it has been found of no real efficacy in effecting a cure. The same author quotes a striking instance of the efficacy of lemon juice, but evidently held it to be inferior to other acids. The very able and accomplished compiler of Anson's Voyage says, "The cure seems impossible by any remedy or by any management that can be employed." Dr. Gallesio of Savona, in an elaborate treatise on the *Genus Citrus*, published last year, takes no notice of this most interesting property of the citric acid: and it may be mentioned as a still farther proof of the neglect of this knowledge on the continent of

Europe, that Captain Flinders, in the *Narrative of his Voyage of Discovery, just published, relates, that when he arrived at one of the most remote points of his destination, his men were all in high health and strength, and with the fresh looks which they brought from Europe, by means of the ample supply of antiscorbutics, with which they were furnished when they left England in 1802; whereas the crew of a †French ship on the like service, was much affected with the scurvy. It is also matter of some wonder, that Captain Cooke's ship in the voyage of discovery to the southern hemisphere, in the years 1773 and 1774, was not furnished with this article; for the rob of lemons and oranges with which he was supplied, has not been found to possess the same virtue as the juice. The chief causes to which he ascribed the great health of his men in that voyage, and which are so eloquently commented on by Sir John Pringle (see Phil. Trans. 1776), were the use of malt, sour krout, and portable soup, together with extraordinary attention to cleanliness and ventilation. It may here be alleged that the scurvy was in this instance prevented without the use of this vaunted specific. But it appears from the narrative, that Captain Cooke was only fifteen weeks and three days on his longest cruise in search of a southern continent, which is not a sufficient time

* Vol. I. p. 226.

† The Geographe, Captain Baudin, Vol. I. p. 164, of this Voyage, drawn up by M. Peron, the naturalist.

to prove thoroughly the efficacy of his methods, and far short of the time for which ships have kept the sea exempt from this disease, by the virtue of lemon juice alone, under circumstances which all other means had failed.

We have in the history of this remedy a striking example of the difficulties and delays which obstruct and retard the progress and adoption of practical truths*. In addition to what has been already stated, it may be mentioned that, in the year 1600, Commodore Lancaster sailed from England, on the 2d of April with three other ships. They arrived in Saldanha Bay on the 1st of August; the Commodore's crew being in perfect

* Among other instances that might be quoted of the neglect and oblivion, and of the future revival, of useful medicines, one of the most striking in the history of physic is that of the remedy for the gout, which within these few years has acquired considerable celebrity; and though it has been suspected of not answering to its original character, is now regaining the public confidence. Demetrius Papagomenos, a medical writer of Constantinople, in the thirteenth century, in a work *de Podagrâ* ascribes to the Hermodactyl the same virtues as belong to the secret medicine above alluded to, known by the name of *Eau medicinale de Husson*. It is sufficiently ascertained that the Hermodactyl is the root of the same plant as the *Colchicum Autumnale* of modern botanists; and it is also ascertained that it is to this last that the medicine in question owes its virtue.

The author is indebted to Sir Joseph Banks, P.R.S. for the knowledge of these particulars; and Sir Joseph allows him to say that he is satisfied with the accuracy of the preceding statement, and also that he has experienced in his own person, all the beneficial effects that have ever been ascribed to this medicine.

health, from the administration of three table-spoonfuls of lemon juice every morning to each of his men; whereas the other ships were so sickly that they were unmanageable for want of hands, and the commander was obliged to send men on board to take in their sails, and hoist out their boats. Purchas's Pilgrim, Vol. I. p. 149.

VI.

Page 520.

No stronger proof of British humanity and attention to medical police can be adduced, than the state of health of the prisoners of war of late years. In former wars, fevers of the most malignant description used to break out in their places of confinement. Some complaints having been made of the pretended ill treatment and bad state of the prisoners of war at Dartmoor in the year 1811, an investigation was instituted by public authority, from which it appeared not only that these complaints were groundless, but that these unfortunate men were treated with the utmost care, and that of six thousand five hundred and seventy-two, the number of which they consisted, only thirty-six were in the hospital, and only one had died the preceding week. It appears farther by the weekly returns made to the Admiralty, that in the course of the year 1813, the average number of French prisoners in Great Britain was sixty-four

thousand six hundred and ninety-two. This was exclusive of Danish and American prisoners, and of those in foreign parts. The total number of deaths of French prisoners in all the *depôts* and hospital ships in Great Britain, amounted in the same year to one thousand one hundred and fifty-four, as appears by the same return, making one in fifty-five, as stated in the text. The following circumstances which are entirely unconnected with their treatment tended greatly to augment the mortality. 1st, The want of exercise and that depression of spirits which is inseparable from a state of captivity. 2ndly, The extreme profligacy of many of the prisoners, some of whom were so addicted to gaming, that they staked and lost their clothes, and even the articles of their subsistence. 3dly, The returns included the deaths of prisoners who had been reduced to the last extremity after a sea voyage, during which they laboured under sickness and wounds, particularly those from Spain, towards the end of this year, after the siege of St. Sebastian's and the battles of the Pyrennees. It is evident that these casualties belong to the calamities inseparable from war, and have no relation to the treatment of the resident prisoners. It is equally evident, that these owed their extraordinary degree of health, to the clean and airy habitations, the wholesome and abundant food, the comfortable clothing and good medical treatment with which they were supplied by the British government: and it is a matter of public expediency and of justice to the national

character, that these facts thus authenticated, should be proclaimed to the world as an answer to the calumnies that have been propagated on this subject, as an appeal to the candour of the enemy, and as a claim on his humanity and gratitude in the event of future wars.—This claim is farther enhanced by the remission in the late treaty of peace, of a large balance due by the French government for the maintenance of their prisoners.

VII.

Page 526.

While the author was a commissioner of sick and wounded seamen, ten recovered men were one day sent from Hoxton to be inspected. Upon questioning them it was found that in four of them the insanity had been occasioned by injuries of the head, of whom three had received these injuries while they were in a state of intoxication.

All the cases of lunacy which occur in the navy, are sent for cure and custody to an institution for the general reception of maniacs, situated at Hoxton, in the immediate vicinity of London. From thence such cases as are deemed likely to receive benefit from the treatment at Bethlem hospital, are removed thither, and if they do not recover in a year they are sent back, unless they are dangerous; in which case they are retained. Table VI.

presents a view of this branch of the service for the last five years of the late war, as extracted from the records of the Transport Office. By adding to the sum of the number recovered during that space of time, the number remaining on the 31st of December 1808, which appears to have been ninety-nine, and dividing the total by the number of deaths, the mortality is found to have been one in 6.8. By documents called for by a Committee of the House of Commons appointed to investigate the state of the madhouses throughout the kingdom, it appears, that the mortality calculated in like manner for Bethlem hospital, was one in eleven, and for St. Luke's, one in sixteen. This high rate of mortality at Hoxton, is an additional presumption in proof of that mismanagement in the institution, which was too apparent from the parliamentary investigation.

On comparing the number of lunatics entertained at Hoxton as stated in the Table, with the number of seamen and marines in Tables I. and II., and supposing the whole maniacs of the navy to be assembled there and at Bethlem, it would appear that more than one in a thousand is in that unfortunate situation; and considering the great length of the war, they may be considered as the whole number belonging to this portion of the community. There are no doubt some maniacs belonging to the ships of war on foreign stations, but their number must be inconsiderable, for they are as soon as possible

sent home as invalids, and lodged at Hoxton. This proportion favours the opinion stated in the text, that seamen are more liable to this malady, than the general population; for Dr. Powell*, on a gross computation thinks, that the proportion of maniacs in the whole population of England, does not exceed one in seven thousand. It must be remarked, however, in abatement of what has been said of seamen, that they are of a time† of life by far the most liable to this malady; about one-third of the whole seizures being of persons from thirty to forty, and much more than one half is of persons from twenty to forty, the whole number admitted at Bethlem from the year 1784 to 1794 having been sixteen hundred and sixty-four, of whom five hundred and twenty-seven were aged between thirty and forty, and four hundred and eighty, from twenty to thirty. After making this allowance with respect to age, it will appear that the proportion among seamen is still greater than in civil life; the principal causes of which have been alleged to be, intemperance, and blows on the head. It appears from Mr. Haslam's work, that of sixteen hundred and sixty-four cases which were received at Bethlem in ten years, five hundred and seventy-four were discharged cured, and from

* Transactions of the College of Physicians, Vol. III. p. 140.

† See a work entitled, Observations on Madness and Melancholy, by John Haslam, apothecary to Bethlem Hospital; also a Treatise on Insanity, by M. Pinel, who makes the same remarks on the maniacs in France.

an account delivered to the Committee of the House of Commons it appears, that at St. Luke's there were admitted in the years 1811, 12, and 13, eight hundred and sixty, of whom three hundred and forty-eight were cured; and it appears from the preceding Table, that there were received in five years, four hundred and twenty-five seamen and marines, of whom fifty-six were discharged cured. It appears from all the statements, that there are little hopes of cure, unless it is effected in the first year after the first seizure. It has been judged advisable by the author to record these facts as matter of future comparison, also as the means and motives of future improvement, and this is the more necessary, as some of them are taken from unpublished documents.

VIII.

Page 531.

The beneficial effects of the ventilation of transports cannot be better evinced than by the following example. In consequence of the very great mortality of convicts on their passage to Botany Bay in hired transports, in which no attention had been paid to counteract the causes of infectious disorders, a large ship named the Glatton, about equal in tonnage to a sixty-four gun ship, originally intended for the East-India trade, which had

been purchased by government to serve as a ship of war, was, soon after the peace of Amiens, destined to transport the felons. While she was under repair, Lord Chichester, the Secretary of State for the Home Department, sent Count Rumford, Mr. Graham, a police magistrate, and the writer of this, to Chatham, in order to give directions for fitting up that ship, so as to ensure proper ventilation. The means recommended were the air-tubes already described, passing from the places where the convicts were to sleep, along the side of the ship to the open air; a narrow opening amidships, the whole length of the upper deck, protected by a covering in form of a pent-house a few inches above it to prevent rain or other things from falling into it, and scuttles in the side to open and shut according to the state of the weather. By the help of these contrivances, together with due attention to cleanliness and diet, and by not being over-crowded, the voyage was performed without either fever, flux, or scurvy arising, and without any loss of lives, except five male and two female convicts from chronic disorders. The convicts consisted of 269 males, and 131 females, besides 31 women and children. She sailed from Portsmouth on the 23d of September 1802, and passed the same port on the 22d September 1803, in proceeding up Channel to the Downs, having returned by Cape Horn, and having made the voyage of circumnavigation in three hundred and sixty-four days, of which she was only two hundred and se-

venty-seven at sea, having been at anchor six day at Madeira, fourteen at Rio Janeiro, and sixty-seven at Botany Bay. The longest time which she was at sea on the outward passage, was eighty-eight days, having sailed from Rio Janeiro on the 14th of December, and arrived at New South Wales on the 12th of March. She sailed from thence on the 22d of May, and touched at no port till she arrived in England; so that she was seventeen weeks and five days at sea. The complement of men with which she sailed from England, was one hundred and seventy, not one of whom died on the whole voyage. Let this detail serve as a record of the perfection to which navigation as well as preventive medicine had attained in the beginning of the nineteenth century.

IX.

Page 538.

The chemical preparations more particularly alluded to here are the composition-metal as it is called, employed for hanging the rudder, and for fastening the sheets of copper to the ship, being adapted for these purposes by its peculiar property of not being corroded by this metal: the preparation of metals adapted by their different degrees of expansibility in different degrees of temperature,

to the delicate adjustments of chronometrical mechanism: also the different sorts of glass, which by their respective habitudes to transmitted light, correct the confusion and error produced by refraction in the lenses of telescopes. This is an improvement which Sir Isaac Newton at one time expressed a despair of ever being attained*. And we have seen a similar despair with regard to the cure of scurvy, expressed in a passage already † quoted from the Narrative of Anson's Voyage, reputed and believed to have been written by Mr. Robins, one of the ablest mathematicians and best writers of the last century. Mr. Robins, therefore, pronounces scurvy to be an *immedicable* disease. It would not perhaps have been thought too presumptuous if any one in like manner had predicted twenty years ago that the discovery of a safe, certain, easy, and speedy method of eradicating the small-pox, was beyond the reach of human sagacity, which has however been since realized. When we perceive therefore that certain useful and important

* See Newton's Optics, Book i. Part II. Prop. vii. and Vol. IV. Page 68 of Horsley's edition of his works. Yet Newton afterwards (as if it had been pre-ordained, that this individual should, in every point of science which he touched upon, maintain his superiority over all the rest of the human species), in a letter to Mr. Oldenburg in the year 1672, (Horsley's ed. Vol. IV. Page 322.) expresses some hopes of this object being attainable, and plainly hints at the principle upon which Dollond, about eighty years afterwards, (see Phil. Trans. for 1759 and 1765) founded his invention of the achromatic telescope.

† See p. 559.

discoveries and inventions have been made, some of them drawn from the deepest recesses of science, others found lurking under the very surface of nature, which the most profound and enlightened minds could beforehand hardly conceive, or believe to be possible, does it not afford a cheering and consolatory prospect, "amidst the thousand shocks that flesh is heir to," that there may still be in store for us, in the boundless progression and endless combinations of knowledge, other hidden means of advancing human happiness, of mitigating human misery, and of making accessions to the power of man over nature "which have not yet been dreamt of in our philosophy*"?

* The Marine Barometer might have been enumerated as another instance of the application of modern science to useful purposes, being an instrument, which, though not directly subservient to health, is occasionally the means of saving life, by giving notice of the approach of danger, and therefore, the mention of it is not here altogether out of place. A very recent instance of this occurred in the hurricane of the 9th of August last, the most violent that has been known on the Atlantic Ocean for many years. A fleet of merchant ships from the West-Indies, under convoy of the Warrior of seventy-four guns, commanded by Captain Rodd, was exposed to its fury. In the course of a few hours before the gale came on, which it did with sudden violence, the quicksilver fell from 30.7 to 29.3 inches. The intelligent and vigilant commander, knew well how to avail himself of this alarming prognostic, by taking in sails, striking top-masts, securing the guns, and making signal to the ships in company to do the same. His own ship, and many others, were probably saved from foundering by this early precaution; but such was the violence of the storm, that several ships were lost notwithstanding this warning.

X.

After this article of the Transactions was put to press, the author found in the Journal Office of the House of Commons, and in the records of the Admiralty, certain documents which promised to throw light on the mortality in the navy in former wars. In the end of the year 1762, the House of Commons issued a precept requiring an account of the number of seamen and marines raised and lost in the preceding seven years' war. The return to this was, that one hundred and eighty-four thousand eight hundred and ninety-nine had been raised, and one hundred and thirty-three thousand seven hundred and eight had been lost, besides one thousand five hundred and twelve, who had been killed. The number under the head of *lost* has been considered as the amount of the deaths from disease, and this construction of it has been given out to the world; but the author thinking this incredible, consulted the records of the Navy Office, and found that all those men who had been sent to hospitals and never returned to their ships, all those who had been discharged as unserviceable, also all deserters were included. This gave no information therefore as to the degree of sickness and mortality. But the House of Commons having required an account of the number of *deaths* in the American war, the Navy Board returned an account of the dead and killed only, as in the annexed

table. It appears from this interesting document, that the total deaths in 1779 was five thousand two hundred and seventy-seven. The deaths at hospitals that year were one thousand six hundred and fifty-eight*, which leaves only three thousand six hundred and nineteen for the deaths on board of ships. This does not accord with the statements in pages 492 and 493, but as there was not time for all the ships to have returned from foreign service, and as the war was not then at an end, a compleat account could not be taken of the deaths, and hence the qualifying clause in the title of the annexed Table, *as far as the accounts can be made up.*

* See Table I.

Number of Seamen and Marines raised from the 29th of September, 1774, to the 29th of September, 1780, also the number who have died and who have been killed, from the 1st of January, 1776, to the 1st of January, 1781, as far as the accounts can be made up.

Dates.	Raised.	Dead.	Killed.	Total.
1774	345			
1775	4,735			
1776	21,565	1,679	105	1,784
1777	37,457	3,247	40	3,287
1778	41,847	4,801	254	5,055
1779	41,831	4,726	551	5,277
1780	28,210	4,092	293	4,385
Total	175,990	18,545	1,243	19,788

PARTICULARS

OF

A CASE

IN WHICH

A VERY LARGE CALCULUS

WAS REMOVED FROM THE

URETHRA OF A FEMALE

WITHOUT OPERATION;

WITH EXAMPLES OF ANALOGOUS CASES.

By JOHN YELLOLY, M.D. F.R.S.

PHYSICIAN TO THE LONDON HOSPITAL.

Read June 20, 1815.

I EXHIBITED some time since, at one of the meetings of the Society, a very large calculus, which had been removed from the urethra of a female without operation, and stated the few circumstances of the case which were then known to me. I have since made particular inquiries into it, both of Mr. Hopké, of Ratcliffe Highway, the medical gentleman who attended the patient, and of her friends: and I have the honor to lay the result before the Society.

J. M. was first observed, at about the age of seven years, to pass bloody urine, after considerable exertion in jumping. This she continued to do occasionally, up to the time of her marriage, which took place when she was about twenty; but she never complained of pain in micturition, and her general health was at all times very good. She became pregnant, and at about the seventh month, began to have great difficulty in passing her water, which lasted till her delivery, and then ceased. The urine was not tinged with blood; but she had some discharge of a purulent appearance, which was suspected to be from the vagina, and to arise from gonorrhœa. It ceased with the dysuria, but its source was not ascertained.

In a second pregnancy, she was delivered of twins at seven months, and soon afterwards became a third time pregnant. During the three last months of her third pregnancy, she had great pain in making water, and the purulent-like discharge returned, and was attributed, as in the former instance, to gonorrhœa. She had a very good time, but could never afterwards retain her water, which she had, up to this period, always been able to do. From this time she was almost continually affected with considerable pain in the region of the bladder, which rendered large doses of laudanum necessary to procure her relief. The discharge was diminished, but there was always a considerable deposit of a purulent appearance in

the urine, as was observed likewise to have been the case in her third pregnancy.

She now passed, with temporary relief, several substances of more than half an inch in length, and described as resembling the fur from the inside of a tea-kettle. She still continued to suffer much pain, and in one of her severe attacks, Mr. Hopké found, by a probe, that there was a small calculus in the urethra very near the external orifice, which he removed without difficulty by means of a pair of forceps. It was about eighteen grains in weight, was rather flat, and was somewhat of an oval form, having the longest diameter rather more than six-eighths of an inch in length, and the shortest about five-eighths. He found by means of a probe introduced into the bladder, and also by the finger introduced into the vagina, that there was a very large stone in the bladder.

The relief obtained by the removal of the small calculus was only temporary, the eneuresis continued, and she was liable to frequent and severe returns of pain. In about half a year afterwards, the stone was felt by the patient advancing into the urethra, and was found by Mr. Hopké, within a few days of this, to have advanced to very near the extremity of the urethra, which was much dilated, and admitted the stone being seen in it. On examination per vaginam, he found the calculus sticking in the urethra, but there was no opening

between the urethra and vagina; and he remarked at the time, that if there had been such an opening, he would have felt himself warranted in enlarging it, for the purpose of removing the stone. In about eight days, he again saw the patient, with Mr. Headington, Surgeon to the London Hospital; when that gentleman, by means of his two fore-fingers, removed the stone without difficulty. Mr. Headington satisfied himself, by careful examination, that no communication existed between the urethra and vagina.

The patient was greatly relieved by the removal of the calculus, her general health improved, and the catamenia, which had not appeared from the time of the third pregnancy, in two months returned, and continued to do so at the proper intervals. The purulent discharge ceased, but she still continued to pass her urine involuntarily. In two years, she became again pregnant; and she suffered much during her pregnancy, from what she described as the pressure of the child upon the os pubis. During the latter months, she was affected with considerable cough and spitting. She had a good time, but was supposed by her friends to have got cold soon after delivery; for the cough and expectoration increased, the latter amounting to a quart in the day. There was but little lochial discharge, she suckled the child for several days, but she gradually lost her milk; her strength became greatly reduced, and she died on the

25th of December, 1813, three weeks after her delivery, in the 28th year of her age. She passed, without difficulty, within the last fortnight of her life, several portions of the same fur-like substance which are mentioned as having come away subsequent to her third delivery. There was no examination after death.

The calculus which was removed from this patient, is of an irregular surface, and of a flattened oval shape, having two little rounded projections at the extremity by which it passed from the urethra. In weight is 3 ounces, 3½ drachms Troy; it is 3⅛ inches long, 2 inches broad, 1⅞ inch thick, and 7¾ inches round in its larger, and 5½ inches in its smaller circumference.

It is composed principally of uric acid, disposed in close concentric lamellæ, having no perceptible nucleus; and a considerable portion of its surface is covered with a mixture of phosphate of lime, and ammoniaco-magnesian phosphate. This covering is thickest at the extremity by which the calculus passed from the urethra; and the projections are made up of it entirely. A drawing of it is annexed *.

There are several instances on record, of very large calculi having been removed from the female

* Vide Plate 4. fig. 4.

bladder without operation; but the most remarkable are contained in the Philosophical Transactions. In the 12th Volume of that work, page 842, George Garden, of Aberdeen, gives an example of a female, who passed four stones of an unusual bigness, one of which measured more than five inches about the one way, and four the other.

In the 15th Volume, page 1271, Dr. Wallis communicated from the Philosophical Society of Oxford, an instance of a calculus, the compass of which was $5\frac{1}{2}$ inches, the length $4\frac{1}{4}$, and the weight 3 ounces avoirdupois, which was removed, without operation, from a lady of 63 years of age.

In the 17th Volume, page 817, Dr. Molyneux gives the case of Margaret Plunket, aged 60, who passed "by the help of nature alone, without the use of remedies, or any forcible means whatever," a stone resembling a flattened pear, of $7\frac{3}{16}$ inches in its circumference, the longest way, $5\frac{1}{4}$ inches where it was largest, and 2 ounces, 2 drachms, 1 scruple, and 6 grains weight, Troy. It was three months lodged in the urinary passage, during which time she suffered great pain, constant strangury, and a perpetual dropping of her water, which last symptom continued after the removal of the stone.

In the same paper Dr. Molyneux states, that

Mr. Proby removed, by means of slight dilatation only, a stone of $1\frac{6}{10}$ inch long, and $\frac{9}{10}$ broad, from a girl of 6 years old; and one of $1\frac{4}{10}$ long, and 1 inch broad, from a girl of 10 years old.

In another paper published in the 20th Volume, page 11, the same gentleman informs us, that the method of dilatation likewise succeeded in removing a stone, of very nearly 2 inches in length, by about $\frac{7}{8}$ of an inch in width, from a girl of 11 years of age.

Dr. Beard, in the 34th Volume, page 211, communicates the history of a female of 63, who had been long afflicted with symptoms of stone in the kidney, and afterwards in the bladder. She suffered much from pain, and one day, after having experienced an "uncommon weight and forcing," she brought away, "with a noise which very much "surprised the whole company," a stone of $7\frac{1}{2}$ inches in its great circumference, $4\frac{3}{4}$ inches round at the thickest place, and $4\frac{7}{8}$ inches in length on the convexity.

In the 42nd Volume, page 363, Dr. Leprotti, Physician to the Pope, gives the instance of a calculus of $3\frac{2}{10}$ inches long, $1\frac{1}{2}$ inch wide, and 1 ounce, 17 pennyweights, 4 grains Troy, in weight, having been discharged from a female of 50, who had long suffered under difficult mictu-

rition. The escape of the stone was preceded by a discharge of 3 pounds of blood.

The late Dr. Heberden, in the 55th Volume, page 128, communicates, on respectable testimony, the case of Elizabeth Coe, a woman of 67, who, after having been afflicted for 11 or 12 years with symptoms of stone, voided without much pain a calculus of $3\frac{1}{4}$ inches in length, $4\frac{3}{4}$ round, and 2 ounces, 2 drachms, and 24 grains Troy, in weight. For two or three days previously, she passed blood.

In most of these cases, as well as in that which I have laid before the Society, an incapacity to retain the urine, continued ever after the removal of the stone; and hence it has been thought, that the parietes of the urethra, in all such cases, are injured by ulceration, which, by making an opening from this tube into the vagina, facilitates the exit of the calculus. This effect is, I believe, not an unusual one; but eneuresis may be fairly expected to be produced without it, solely by the injury done to the neck of the bladder and urethra, by the long continued distention of a large and hard substance. That no such communication had taken place in the present case, there is satisfactory evidence; and when we consider the shortness of the female urethra, the thickness of its parietes, the want of resistance from contiguous parts, and the facility with which it has

in many instances been distended by mechanical means *, it is the less to be wondered, that the long continued pressure of a calculus in the female, has often produced a sufficient dilatation for its removal. As a point of analogy on this subject, we have the great dilatability of the biliary ducts, evinced by the magnitude of the concretions which have passed through them into the duodenum †. The practical application of these facts, viz. that the operation of lithotomy may, in many instances, be superseded in females, is an important one, and has been long acted upon in surgery.

* Mr. Thomas has recorded one of the most remarkable instances of the dilatability of the female urethra, in the first Volume of the Transactions of this Society.

† The present Volume contains an example, also by Mr. Thomas, of the discharge of a biliary concretion of uncommon dimensions.

CASE

OF THE

SUCCESSFUL TREATMENT

OF THE

INCONTINENCE OF URINE,

CONSEQUENT TO SLOUGHING OR ULCERATION OF THE BLADDER FROM INJURY DURING LABOUR,

WITH OBSERVATIONS.

By S. BARNES, Esq.

SURGEON TO THE DEVON AND EXETER HOSPITAL, AND TO THE WEST OF ENGLAND INFIRMARY, FOR DISEASES OF THE EYE.

COMMUNICATED BY

DR. GOOCH.

Read May 9, 1815.

THE malady to which these observations relate, is one which occurs most commonly in the younger part of life; and from its peculiar circumstances is attended throughout the course of it with as much wretchedness perhaps as any to which females are liable, excepting those whose distress is aggravated by severe bodily pain. I am induced to offer to the Society the following ac-

count of the management of one of these cases, in which a new mode of treatment was tried, and proved perfectly successful, with the confident hope that by early and assiduous attention, many such may be cured which are now passed over without examination; or, when their nature is ascertained, are treated without sufficient watchfulness and perseverance, or at once abandoned as afflictions without remedy.

In answer to some inquiries I addressed in 1814, to Dr. Gooch, respecting the best mode of treating these injuries, which I found to be of not unfrequent occurrence; he informed me of a mode of palliating the inconvenience arising from them, which had been suggested to him by Mr. G. Young. It consisted in introducing into the vagina an elastic gum bottle, of a suitable size, to one side of which a piece of sponge had been previously sewed, large enough to cover the aperture into the bladder. It was thought probable that this would effectually prevent the incessant dribbling of the urine; and that the patient by introducing a finger, and compressing it, might at proper intervals allow the urine to pass.

A short time after the following case came under my care.

A young woman, after a labour of some days' continuance, was delivered by the perforator and

crotchet of her first child, which had been dead apparently about two days. During the labour she gradually lost the use and nearly the feeling of the lower extremities, accompanied by very severe spasms and pain in the hips. In the early part the urine was passed frequently; towards the end it was generally forced off during a pain, but no considerable quantity was at any time collected in the bladder.

After delivery the urine was discharged involuntarily, and she was scarcely sensible of the passage of the fæces, though she had the perfect power of retaining them. The numbness of the extremities and the spasms still continued. The parts about the perineum were considerably swelled, and a very fœtid and dark-coloured discharge, in which were occasionally observed small portions of membranous sloughs, followed the delivery and lasted for about a week. During the fifth and sixth days she had the power of retaining the urine for more than three hours; but when it passed it scarcely allowed her time to move from her position in bed for the purpose. From the 7th day, she lost all power of retaining it.

When I saw this patient at the end of three weeks from her delivery, the urine was constantly flowing when in bed. She retained it but for a short time when sitting up, and under the

latter circumstances she was utterly unconscious of its coming until she felt wetted by its presence. She had been gradually recovering from the numbness of the extremities, though unable to walk without help; and had recovered a perfect sense of the passage of the fæces.

The retaining the urine at will not returning with the increasing sensibility and strength of other parts; and the knowledge of the circumstances attending her labour, rendered it probable that some communication had been formed between the bladder and vagina. And on introducing a catheter through the urethra, and a finger into the vagina, an opening was immediately discovered just about the neck of the bladder, which exposed the instrument for more than an inch in length, and through which the point of the finger could be passed into the bladder. The edges of the aperture were irregular, soft and yielding, the touching them caused no pain, nor did any blood make its appearance on withdrawing the finger. The swelling of the parts about the entrance of the vagina had subsided quickly under the use of a decoction of chamomile flowers, which had also been regularly thrown into the vagina whilst any unhealthy discharge proceeded from it.

A flat silver catheter was left in the bladder, and a few days after an elastic gum bottle was introduced into the vagina. A firm one was se-

lected, capable of containing two ounces of water; and had sewn on the convexity of its side a thin fine piece of sponge as large as a dollar. A double string was passed internally through its bottom, and left hanging through its neck. The sponge was well smeared with the calamine cerate, the bottle dipped in oil, folded longitudinally and passed into the vagina with the sponge in front. From its elasticity it immediately expanded, and by a finger introduced through the neck it was readily placed in its proper situation, so as to bring the sponge immediately opposite the perforation in the bladder. The catheter was then withdrawn.

In this situation it filled the vagina, and kept up a gentle and equable pressure on the injured part, so equable and so effectual that whilst the bottle was in the vagina the urine was perfectly retained for a little more than two hours. If the bladder was not then emptied by the catheter, the urine continued to ooze away until it was drawn off. Guided by this the catheter was introduced every two hours during the day. This was preferred to keeping the instrument constantly in the bladder, as she found much inconvenience from its remaining there when sitting, and without further mechanical aid it was not possible to keep it steadily in its situation when walking. It was not thought that the opening would be stretched by the inconsiderable dilata-

tion of the bladder from the urine collected during the course of two hours, as she drank but very little in quantity, and the water drawn off seldom exceeded two ounces, generally did not amount to so much. Provided no urine passed through the opening, the principal object appeared to be obtained, and the patient was enabled at the same time to get out of doors. When in bed a short flat catheter was kept constantly in the bladder. The bottle was withdrawn, and a fresh one introduced every morning before she left her bed.

The comfort afforded by this plan in keeping her dry during the day was exceedingly great. She was enabled to move, sit, or lie without inconvenience, nor was she ever wetted unless the bottle was become soft from use. This, when discovered, was carefully guarded against by renewing it frequently. In a short time she learned to pass the catheter herself, and felt happy in being thus relieved from much of her anxiety and dependance.

At the end of a month the opening was found to be very perceptibly lessened. At the end of two, it was not more than large enough to admit the catheter to pass into the vagina. In the course of the fourth month she found occasionally that the bottle did not answer in keeping her perfectly dry as it had hitherto done. The perfora-

tion at this time was so much contracted as not to allow of the catheter being felt through it, but some degree of vacancy at the spot was still perceptible. A few weeks afterwards on another examination, the depression was still existing at the injured part, and the catheter could be distinguished there more sensibly than either above or below the spot. The investigation was made with much caution and gentleness, and the result was such as to evidence a belief, that the aperture had closed. The same means were continued however for a fortnight longer, after which the bottle was left off by day, as it was found she remained perfectly dry without it. The catheter however was still introduced every two hours whilst up, and at night the bottle and catheter were employed as at first, it being thought most prudent still to keep up a moderate pressure, and to prevent any distention of the bladder, or even that natural action of it which would be required if the urine were expelled without the aid of the catheter.

After a short period the time of drawing off the water was gradually lengthened, until it was retained six hours. The use of the catheter was still continued for some weeks longer, though the bottle had been for some time left off. At the end of about nine months she resumed her natural habits, in every respect as well as before her labour.

In this instance the loss of substance from sloughing or ulceration, was considerable; as great probably as commonly occurs in cases of this nature; and the opening may be considered as being closed at the end of a little more than five months from the receipt of the injury.

This is the only case of recent injury which has come under my notice. The subjects of those which follow were all patients of the hospital in this city about the same period. For one of them only were any means of cure undertaken, and they proved of little avail. The cases are not otherwise of interest than as illustrating some points in the history and treatment of this injury.

CASE II.

Devon and Exeter hospital, 1813.—Reed, æt. 19, fourteen months before her admission was delivered of a dead child (her first), without any assistance from instruments, after a most severe labour of about 50 hours. The water was drawn off once during labour, and she has no recollection of having at all retained it after its termination. It was followed by considerable inflammation with a dark coloured and offensive discharge.

The vagina is now contracted just about the opening of the urethra into a callous ring, large enough to admit the passage of the finger. Above this the os tincæ can be felt adhering by its front edge to the posterior part of the bladder, and forming the upper edge of a circular opening leading into the latter. The breach is large enough to admit the point of the finger, and has a very firm thickened edge. The urethra, about half an inch from its inferior termination, is closed so as not to admit the passage of a very fine bougie, or the passage of any fluid into the bladder by injection.

The case was considered irremediable. It appeared that no examination into the cause of her complaint had ever been made until the present time. It is an instance of the effect of neglect in adding to the evils of a very severe injury. In all probability the contraction of the vagina might have been prevented; certainly there could have been no difficulty in keeping the urethra pervious, and giving the chance at least of the closing of the opening above. As it is, all hopes of cure are extinguished, and the means of palliation rendered more than commonly difficult of application.

CASE III.

Devon and Exeter hospital, 1814.—S. Hurston, æt. 36, after a lingering labour of four days, was delivered by instruments of a dead child. The water was drawn off several times during her illness, and once after her delivery. From the first day, she thinks the urine began to flow involuntarily, and has so continued to the present time. When sitting up and perfectly still, she can sometimes retain it for the space of an hour.

On examination at the end of seven months from her delivery, a circular opening was discovered between the neck of the bladder and the vagina, large enough to allow of the passage of the catheter into the latter. The edges of the perforation thickened, but soft.

After a period of seventeen months from her delivery, she became a patient of the hospital. At this time the aperture had considerably lessened, allowing only of the passage of a common probe, but the inconvenience remained unabated. Nearly the same means as those detailed in the first case were employed for about two months, without effecting any perceptible amendment, though during their use the evil was materially

alleviated, the patient being enabled whilst at rest to retain her water nearly three hours. When she moved, a slight oozing took place, but by a frequent use of the catheter (which she had been taught to introduce herself) she was able to keep herself tolerably dry. Finding her complaint as distressing as ever if the bottle was omitted, she became impatient, and left the hospital, provided with a catheter which she kept in through the night for some months longer. For a short time after her discharge a piece of cork dipped in wax, resembling the elastic gum bottle in form, was employed, but it never answered the purpose of stopping the dribbling of the urine as effectually as the latter, and occasioned from its unyielding size some pain and difficulty in introducing it. At the end of six months from her discharge from the hospital, her complaint continued in the same state.

CASE IV.

E. Williams, æt. 26, September, 1814. Devon and Exeter hospital, ten months since was delivered of a dead child (her second) after a very severe labour of three days. During the last two she passed no water. An attempt was made to introduce a catheter, but unsuccessfully, about six hours before the birth of the child. From that time the urine passed off involuntarily for a week. She

then recovered the power of retaining it in the natural way for three days. On the last of these, she felt sensible of something giving way, as she expressed it, in the birth; the urine immediately flowed off, and has continued to do so to the present hour. For the three days in which she passed it naturally, it was very thick, resembling whey. She had a very offensive discharge from the first, and several times brought off small sloughs. There was some laceration of the perineum, the labia swelled, with many internal ulcerations for some weeks. For three or four days after her delivery she could not retain her stools, and for nearly a month she lost all sensation in the nates.

An examination was made at the end of five weeks from her confinement, when a catheter passed with readiness through an opening at the posterior part of the bladder just above the urethra.

No perforation could now be felt, or discovered by a very careful examination. It could be perceived however that the urine did not pass from the urethra, but from some spot higher up in the vagina. Her own sensations had already fully convinced her that it did not come by the natural channel, and she was particularly conscious of it when lying on her back. The catheter passed in with some trifling obstruction, and

not without occasioning considerable soreness and pain. It was found that she was now in the sixth month of her pregnancy, in consequence of which she could not be kept in the hospital.

She has since, I hear, been delivered of a full grown child. Her complaint continued as before. But for the history of the case, and the fact of the opening having been observed soon after labour, which led to a minute examination, this might easily have been regarded as an instance of incontinence of urine not depending on a fistulous opening, the perforation being not at all discoverable by any thickening or hardness of its edges, or by any perceptible vacancy in the posterior surface of the bladder.

CASE V.

Devon and Exeter hospital, 1814.—A. Sheay, æt. 28. The opening of communication large enough to admit the catheter with facility. The vagina irregularly contracted by very firm bands.

Four years since she was delivered in Portugal of her fourth child. The labour had continued nine or ten days before the Portuguese midwife sent for a surgeon of the English army, who found the arm in the vagina. He turned the

child, and left her. It was three days after this before the fœtus was expelled in a putrid state. She had no retention of urine during labour. On the second day after her release, the urine burst from her in considerable quantity, and has continued to trickle away unchecked by any position, or any other means from that time.

The narrowing and altered direction of the vagina prevented the application of any compression. Nothing was attempted.

The injury of the bladder during labour which induces a sloughing or an ulceration of its coats is in most instances, I believe, the consequence of pressure. It may in some cases be produced by instruments, and in others aggravated by the distended state of the bladder itself. The breach is generally in the same situation, varying in size according to the degree of pressure, and consequent inflammation. There appears to be always a disposition in it to contract to a certain point, and then continue fistulous, unless the narrowing is prevented by the adhesion of its edges to some contiguous part. In two of the cases here related (III. and IV.) in which there were no adhesions, the diminution of the aperture had been very marked, without any interference from art, but in neither instance is the closing of it a matter of probability. These patients were not in any worse condition at the outset than the sub-

ject of the case first given, and the same treatment early employed would, there is much reason to think, have been followed by an equally successful result. In the other cases (II. and V.) the injury appears to have extended further, but the neglect of timely attention had produced consequences which formed an insuperable bar to any hope of cure, or alleviation.

The point of primary importance in the treatment appears to be an early application of the means of cure. The principle of the management is simple. It consists in keeping up that degree of pressure which shall prevent the flow of urine through the opening, without exciting ulcerative inflammation, and in providing at the same time a free passage through the urethra.

The pressure should be commenced as soon as the inflammation of the parts will allow. It has been directed to be made by cork, or wax of a suitable form, by linen, or by a bag filled with cotton, and coated with elastic gum*. These modes are all however in some respects imperfect. The solid bodies cannot in any degree adapt themselves to the form of the cavity they occupy; and if introduced of sufficient size to bear with effect on the opening in the bladder, are the cause

* Desault.

of pain and inconvenience. Nor with every care in giving them the most suitable shape, can they easily be directed so as to bear steadily and with effect on the deficient point. All these defects are not found in the softer modes of compression above-mentioned, but they are neither of them so complete in their office as the bottle of Caoutchouc. This can most readily be introduced and withdrawn; when passed in, it occupies fully the space allowed it; it injures no part by its pressure; and its elastricity is such as to continue a sufficiently firm and equable bearing on the opening, which it closes more exactly than any solid body can do, as from its hollowness it admits of the sponge being placed in the best possible situation. On this last account, as well as from the facility of introducing it when folded, it is preferable to the solid gum of a similar size and form.

The passage of the urine will be best preserved, without interfering with the pressure, by means of a flat catheter continued in the bladder, or introduced at short intervals.

In cases in which expectation of a cure is no longer entertained, the same means will perhaps be found the most efficacious in procuring some alleviation of the evil, as well as the most easy of application.

In order to fit the elastic gum bottles for the purpose, those which are the thickest, and most firm, should be selected, of a size most suitable to that of the vagina. They should be softened, and filled temporarily with clay to give them a smooth and regular form. It will be necessary to have three or four in use which should be changed daily: by this method they have time to recover their firmness by exposure to the air; and their form may be preserved by stuffing them with horse-hair. The sponge attached to the side, should be thin and compact in structure. And a cord passed through the bottom of the bottle will much facilitate the withdrawing it.

Pressure employed as a means of cure when the opening is become fistulous, in the only instance here given of its operation, was followed by no perceptible advantage. The trial however was much too short to warrant adducing the case as any satisfactory proof of its inefficiency*. It might probably have been assisted by scarification of the

* In the relation of the practice of Desault, whose genius and industry were never exerted in vain, it is stated that he succeeded by means of pressure in curing cases in which the evil had existed a considerable time, but that it was found necessary to continue it for more than twelve months. Desault is the only author with whom I am acquainted, excepting Richter, who delivers his opinion with any clearness or confidence on this subject; and the sentiments of the latter are chiefly a transcript from the first. The cases have, I believe, been generally set down as incurable.

edges of the opening. The cure under such circumstances will be found, I doubt not, infinitely more tedious, and difficult of accomplishment than where an early attention has been paid to the complaint. It is a sufficient reason for making an examination into the cause of every case of incontinence of urine consequent to labour. The object is too important to allow us to trust to conjecture however reasonable, when better evidence is within our reach.

A CASE

OF

MORTIFICATION OF THE UTERUS

OCCURRING

A FEW HOURS AFTER DELIVERY,

WITH SOME

REMARKS ON THE CAUSES THAT PRODUCED IT.

By THOMAS GRAHAM, Esq.

MEMBER OF THE ROYAL COLLEGE OF SURGEONS.

Read July 18, 1815.

A Lady 37 years of age, who had experienced in the summer of 1812 a slight paralysis, affecting the tongue and right arm partially, and who four successive times had miscarried, between the fifth and sixth month; applied to me to attend her in the autumn of 1814, being in the sixth month of her pregnancy.

On my visiting her she complained greatly of the weight of the child, and of a total want of

power in the abdominal muscles to support the burthen of the Uterus, which externally examined was exceedingly prominent, and tense for that period of gestation. Under these circumstances she could not take the most moderate exercise without great inconvenience and apprehension of danger; and although the alimentary canal was duly regulated, the muscles of the body evidently wasted amidst a general increase of fat: a disposition to sudden obesity, which I have frequently remarked to be the concomitant of disease.

At the beginning of the seventh month I was hastily summoned at six in the morning, in consequence, as the nurse supposed, of the escape of the liquor amnii; but as no considerable pains ensued till the following day, the state of the os uteri was not ascertained, and subsequent observation proved to me that this fluid, which was about half a pint, had passed from between the chorion and amnion, a variety not frequently demonstrable.

On the following day, at five in the afternoon, I was again sent for; the dilating pains of the os uteri had increased in force and frequency; and on examination, as I found the membranes protrude, I instantly determined to rupture them, but so rigid was their texture that they did not yield with the usual facility.

The fluid which now escaped was greater than I had ever experienced, it completely flooded the bed, filling two-thirds of a wash-hand basin, and running down in every direction, and I think I should not exceed the fact were I to estimate the quantity at ten pints: indeed the unusually distended state of the uterus prior to the evacuation, would fully support that estimate.

The feet presenting, I gently delivered the uterus of a small sickly child, which lived till the third day; the placenta readily separated without hæmorrhage; and except a sensation of emptiness, such as is complained of after tapping in the ovarian dropsy, and some degree of faintness, not a symptom occurred to create a doubt of the security of the patient till early the following morning, when a severe rigor continued for some minutes, and was succeeded by constant and acute pain in the region of the uterus.

It should be remarked here also, that there had been no contractile intermittent pains of the uterus since the delivery; the pain now described was incessant, accompanied with a great degree of heat, and extending toward the groins.

Inferring from these symptoms, inflammation of the substance of the uterus, I immediately took from the arm sixteen ounces of blood; six grains of the submuriate of mercury, with twenty grains

of rhubarb were also prescribed, and injections of warm water frequently administered.

In two hours the pulse was much reduced, the countenance had the peculiar and contracted character of enteritis, while the brain, as is not unusual in inflammation of the intestines, was undisturbed to the last. On examining the blood, there was no buff on its surface, nor was the crassamentum the least sizy.

The calomel and rhubarb had acted three times, and the evacuation abounded in yellow bile.

The pain still continuing, though less acute, a large blister was applied to the region of the uterus, and sixty drops of laudanum were added to an injection.

Notwithstanding all these exertions, symptoms of dissolution began to appear; the extremities grew lax and cold, the intestines became inflated, occasional hiccup supervened, though the stomach retained both medicine and food to the very moment of the patient's death; which took place within six hours from the commencement of the rigor.

The following day, (the third of October) putrefaction had so rapidly advanced, that the cuticle

separated on the slightest touch, and the breasts, shoulders, and arms, were greatly discoloured.

On dividing the parietes of the abdomen, hardly a muscle could be discovered; the thickness of the fat was from one to two inches; the intestines were distended with air, but not inflamed; nor was there a greater collection of lymph in the cavity of the abdomen, than is usually found after death.

The internal coat of the stomach was smoother than in health; the liver rather smaller and paler than common; and the spleen, kidnies, and urinary bladder were perfectly sound.

The fatal mischief, as I had conjectured, existed in the uterus, which was found to be uncontracted and of a dark and livid hue, with several gangrenous spots on the internal surface, some nearly penetrating the substance of the uterus, and others in a more incipient stage of erosion.

In accounting for this speedy destruction of the tip of the uterus, I consider that the physiologist may reasonably assign the two following causes.

First, he may allege the accumulation of the liquor amnii, producing by its pressure a morbid change in the structure of the uterus; an opinion which may be further supported by the total

want of muscular contraction after delivery, and by a rapidity in the progress of mortification, in this instance far exceeding that which is the effect of unsubdued inflammation when arising from common causes.

And secondly, he may suppose that the strength of the patient's constitution was not sufficient for the work of gestation during the last six years, she having miscarried in that period four successive times, and that but for the retention of the liquor amnii in consequence of the diseased and thickened state of the membranes, the same event would unquestionably have again occurred; and therefore that to the general exhaustion of the living principle, and not to any particular morbid change in the uterus itself, from pressure occasioned by excess of the liquor amnii, the fatal termination of this case is to be attributed. It becomes a consideration also whether from the repeated failures of the uterus to support the fetus, a diseased action had not for years existed in that viscus, as we know from observation that chronic inflammation may continue for an indefinite time in the vital parts of the body without much disturbance of the animal functions.

With respect to any additional treatment, should such a case again occur, I am inclined to believe, that had the membranes been punctured at the sixth month, the life of the patient would have

been preserved; as miscarriage about that period of gestation had uniformly ensued for four successive times, and would, I think, have again occurred from the general debility of the constitution, had not the diseased state of the membranes so effectually resisted the liquor amnii.

But after reading the observations that have been published from time to time, (and especially the paper by Dr. S. Merriman, in the Third Volume of the Society's Transactions,) on the propriety of inducing artificial delivery, who would conceive himself warranted in extending so hazardous a line of practice, when the bones of the pelvis possess their natural dimensions, and when the benefit to be derived from such a proposal must be attended with a considerable share of danger to the patient, and not a little to the medical reputation of the practitioner?

Turnham Green,
May, 1815.

ON THE USE

OF THE

LACTUCA VIROSA,

IN

HOOPING-COUGH.

By T. GUMPRECHT, M.D.

PHYSICIAN IN HAMBURG AND HOLFRATH IN SAXE-COBURG.

COMMUNICATED BY

WILLIAM LAWRENCE, Esq.

Read December 6th, 1814.

THOUGH the number of remedies recommended for the hooping-cough is already very considerable, yet I believe I may be allowed to increase it with one, which, by experience, I have found to be extremely efficacious.

My observation of the good effects of the *extractum lactucæ virosæ* in the dyspnœa of hydrothorax, and in spasmodic asthma in general, led me to conjecture that this medicine might also be useful in the hooping-cough, as this disease seems to be a spasmodic affection of the diaphragm and of the

organs of respiration, and often resists the best methods of treatment.

It has been with reason observed, that hitherto, in the treatment of this disease, the *stadium catharrale* has not been sufficiently distinguished from the *stadium convulsivum*. The first stage is inflammatory, and ought to be opposed only with mild antiphlogistic, diaphoretic, and demulcent medicines. If, neglecting these precautions, irritating, antispasmodic medicines be employed at this period, experience has frequently shewn that they may produce very bad effects. It is only when this stage is past, and the *stadium convulsivum* has taken its place, that it is proper, according to the age and bodily constitution of the patient, to apply the above-mentioned means.

As the herba lactucæ virosæ does not grow in all places, and is sometimes confounded with the herba lactucæ scariolæ, great care must be taken that the extractum lactucæ virosæ (which is made from the inspissated juice of the herba lactucæ virosæ) be genuine and properly prepared. In the neighbourhood of Hamburg, for example, this plant does not grow, and the apothecaries of this place procured the extract from Hildesheim*.

* The mode of preparing the extract is stated in Collin's Observ. circa morbos, Part 6, Vol. XIV. and Murray's Apparatus Medicaminum, Vol. I. p. 170.

Some months ago, I communicated my observations on the beneficial effects of this medicine, to one of our most employed and esteemed physicians, Dr. Chaufepié, who, as well as several other physicians here, has used it with great success. On this occasion I received the following letter.

(TRANSLATION.)

"I return you many thanks for the friendly "communication of your observations on the ad- "vantages of the extractum lactucæ virosæ in "cases of the hooping-cough. The present epi- "demic, though mild, and of a good sort, and "very seldom accompanied with dangerous symp- "toms, has furnished opportunities sufficient, to "make experiments with regard to the application "and the advantages of this method of cure. I "immediately communicated your observations to "several other physicians here, and we have all "found this medicine to be a valuable and pow- "erful specific in the above-mentioned disease. "Its efficacy is great in the second stage, or the "convulsive period of the disease. To children of "two years, I gave it three times a day, at first "in doses of half a grain, with sugar alone, united "with any of the other medicines usually employ- "ed. At this age I have not administered it in "doses of more than three-fourths of a grain. The "coughing fits soon became more rare, and more "gentle, the expectoration took place with less "effort, and in general without vomiting; and the

"spasmodic affection in the region of the dia-
"phragm apparently gave way. Upon the whole,
"this medicine seems, in a short time, to give the
"cough a different character, and considerably to
"diminish its duration."

Dr. Hempel and Dr. Jacobsen of this city have also, on my recommendation, employed this medicine in the spasmodic stage of the hooping-cough, and acknowledged its beneficial effects. With regard to the modus operandi of this remedy, it is well known that the cuticular system is much connected with the urinary organs and those of respiration; and as the lactuca virosa has a considerable operation on the skin, is a powerful anodyne, and a strong diuretic, it may, for these reasons, be of great utility in the hooping-cough. Among the antispasmodics furnished by the vegetable kingdom, it will be difficult to find one which unites in itself the same qualities, in so remarkable a degree as this medicine.

That the lactuca virosa must act as a specific on the organs of respiration, is rendered probable by the benefit derived from it in spasmodic affections of the breast, and in the dyspnœa of hydrothorax: for when, particularly in the last-mentioned instance, all diuretic and antispasmodic means are found to fail, an alleviation of the dangerous symptoms, if not a cure of the disease, may almost always be experienced from the use of the lactuca virosa.

I shall now present to the Society, from my own journal, two cases in which a cure of the hooping-cough was effected by the medicine in question.

CASE I.

J. K. a child 15 months old, had been for eight days troubled with a cough, of which several children in the neighbourhood, with whom this child had been in contact, had died. The fits were at first merely of the catarrhal kind; but five days after the commencement, the following symptoms appeared. When the fit came on, the child endeavoured to support itself by stretching out its arms; it became red in the face, and tears started into its eyes; during the coughing the child was seized with a suffocating affection; its breath stopped, and the by-standers imagined it was about to be choaked; the belly was spasmodically contracted; the characteristic whistling tone of the hooping-cough in drawing in the breath appeared, and the fit ended with vomiting. Similar fits took place five or six times during the day, and several in the night. Towards evening an increase of heat in the skin, and thirst were perceived. Hitherto the parents had used several prescriptions, which I had before written for attacks in the chest, in the same family; and as these failed of success, I was

called in on the 28th of June, 1812. I found that the child suffered much; the coughing fits were very frequent, and the fever had increased. I ordered a draught composed of aqua fœniculi, gum arabic, and vinum antimonii Huxhami *.

June 30. The coughing fits were still the same. I ordered the same medicine to be continued, substituting only spiritus Mindereri, in lieu of the vin. ant. Huxh.

July 2. As the fits had rather increased than diminished, with however a diminution of the fever, and thirst, I ordered one of the following powders to be given every two hours, viz. R. extr. lact. vir. gr. iv. sacch. lact. 3jj. Div. in x. partes æquales.

July 4. The coughing and suffocating fits were become less frequent, the vomiting less violent, and sometimes it did not take place at all. The child became more lively, and had no fever. I ordered at the same intervals one of the following powders, viz. R. extr. lact. vir. gr. vj. sacch. lact. 3jj. Div. in xi. partes æquales.

July 6. The coughing fits recurred less frequently, were considerably diminished, as to intenseness, and the vomiting had ceased. The suffocating fits no longer appeared during the day,

* The old antimonial wine of the London College.

but sometimes returned in the night, though not so violently as before. The child passed much urine, was cheerful, and had some appetite. I ordered every two and a half hours one of the following powders, viz. ℞. extr. lact. vir. gr. vij. sacch. lact. ʒjj. Div. in x. partes æquales.

July 8. The cough had nearly again taken the form of a catarrhal cough. In the morning the child still coughed at times, and in the night still more, but without any spasmodic attack. I ordered the prescription of the 6th to be continued.

July 13. During the whole of this day the child coughed but little, and seldom. In the night-time the cough returned, from time to time, with some violence, but without suffocation and vomiting. I continued the last-mentioned powders, and in the evening before the child went to sleep, caused a powder and half to be administered.

July 15. The cough had now completely assumed the form of a catarrhal cough in the last stage. I ordered a mixture aq. fl. naph. (aurant.) extr. myrrh. extr. cort. per. and eleosacch. fœnic.

CASE II.

On the 31st of December, 1812, I was called to attend a girl of four years of age, who had been

for seven days affected with the following symptoms. In the day-time she had several fits of coughing, attended with a threatening suffocation; and the characteristic crying sound of the hooping-cough, ending with vomiting. In the evening she had heat and thirst. As this was only the first stage of the illness, I ordered a mixture of gum arabic, oxym. simpl. aq. fœnic. and a little vin. ant. Huxh.

Jan. 1, 1813. The fits had not assumed a better appearance, but on the contrary became worse. The suffocating attacks returned more frequently, the heat and thirst in the evening continuing. The mother of the child informed me, that it had been for some time troubled with worms; and on this account I ordered a purge of pulv. rad. jalap. and calomel, and continued the above mixture.

Jan. 5. The coughing fits were increased, and in the evening a fit lasted nearly nine minutes. The suffocating attacks were violent, and the vomiting frequent. In the evening there was some fever and thirst. The purgative had operated eight times, and expelled a quantity of ascarides. I now ordered one of the following powders every two hours, in chamomile tea.

℞. extr. lact. viros. gr. vj. sacch. alb. ʒij. Div. in xi. partes æquales.

Jan. 7. Hitherto I could perceive no change

in the symptoms, and therefore ordered ¾ths of a grain of extr. lact. vir. with sugar every two hours. In the morning, on account of the worms, I ordered a second purge.

Jan. 9. The coughing fits had decreased a little in violence, and the patient brought up much tough slime, after the attacks. In the evening she had a little fever. She had had several fœtid stools, but no appearance of worms, and there was great want of appetite. I ordered one grain of the extract every two hours, and provided the proper diet, which the parents, poor people, had been hitherto obliged to neglect.

Jan. 11. Though the coughing fits still continued as violent, yet they returned seldomer. On the preceding day, the cough had been accompanied with bleeding at the nose. The child passed much urine.

Jan. 12. The coughing fits are now considerably diminished in intenseness and frequency, the patient having had only one fit yesterday, and two in the night. Much urine, and an easy expectoration. Medicine as before.

Jan. 15. On the 13th she had three attacks of the cough, but without vomiting, and of shorter duration than before. Much urine, expectoration easy. On the 14th a little coughing without vomit-

ing, during the day; the night quiet. The powders continued in smaller doses.

Jan. 28. The cough had in the mean time assumed the form of a catarrhal cough. I gave a jelly of Iceland moss, with bitter extract to complete the cure.

SOME EXPERIMENTS

ON THE

CHEMICAL NATURE

OF

CHYLE,

WITH A FEW OBSERVATIONS

UPON

CHYME.

By ALEXANDER MARCET, M.D. F.R.S.

ONE OF THE PHYSICIANS TO GUY'S HOSPITAL.

Read June 20, 1815.

THE following experiments were made in November, 1813, chiefly with a view to determine whether any sensible chemical difference could be traced between chyle obtained from an animal previously fed with vegetable food alone, and chyle procured from another creature of the same species, after a meal consisting solely of animal food. It is through Mr. Astley Cooper's kindness that I obtained the chyle with which I tried these experiments. The animals from which he procured it were dogs, and it was collected from the thoracic duct, within three

hours after they had been fed, and before the functions of life were entirely extinct.

Examination of the chyle from vegetable food.

It appeared, a short time after being collected, in the form of a semi-transparent, inodorous, colourless fluid, having but a very slight milky hue, like whey diluted in water. Within this fluid there was a coagulum, or globular mass, which was also semi-transparent and nearly colourless, having the appearance and consistence of albumen ovi, or of those gelatinized transparent clots of albuminous matter, which are sometimes secreted by inflamed surfaces. This mass had a faint pink hue, and minute reddish filaments were observed on its surface *.

The fluid part (which I shall call the serum of chyle in opposition to the coagulum), being care-

* It is scarcely possible, on viewing coagulated chyle, not to be struck with the analogy which exists between blood and that fluid. Yet the coagulum of chyle, besides the absence of colouring matter, has much less consistence and firmness than that of blood, and when allowed to stand for some time in a separate vessel, as will be presently detailed, it almost entirely passes to the fluid state, and with the exception of a small remaining clot, it becomes scarcely distinguishable from the serous part. Mr. Vauquelin (Annales de Chimie, Vol. 81.) thinks that, in its chemical nature, the coagulum of chyle bears an imperfect resemblance to the fibrine of the blood. He considers it as a sort of *unfinished* fibrine, holding an intermediate

fully decanted from the coagulum, and both being weighed, the weight of the former was to that of the latter as 100 to 48; but on allowing the coagulum to stand in a phial by itself, there began to ooze from it, in the course of a few minutes, successive quantities of a fluid which did not differ in appearance from the serosity first separated; and this oozing continued till the coagulum was reduced to a very small clot. This residue began to putrefy at the end of a week. On adding caustic potash to the fluid yielded by the coagulum, a slight ammoniacal smell was perceived, without any precipitate being formed. The mineral acids, and especially the nitric, produced from this fluid an abundant precipitation of dense white flakes, which, by dilution in water, and with the assistance of heat, were, in a great degree, but not entirely, re-dissolved.

The serous portion had the following properties:

place between albumen and fibrine, a supposition which implies that the albumen is developed the first, and that the fibrine is formed from it. On the other hand, Mr. Brande observes (Philos. Transact. for 1812, p. 92), that "the coagulated portion of chyle bears a nearer resemblance to the caseous part of milk than to the fibrine of the blood." I am however inclined to believe, from my own experiments, that the caseous substance in question is independent of the coagulum of chyle, and bears but a very small proportion to it, and that albumen is the principal ingredient of the coagulum. The cheesy or fatty matter found in the coagulum is probably of the same nature as that which sometimes appears in much larger quantities on the surface of the serous part of chyle, as will be noticed in a subsequent part of this paper.

Its specific gravity was, in one specimen, 1021.5, and in the other 1022. At the end of 10 days, it was not in the least putrid, though the weather was rather warm, but had only a very slight smell of the acescent kind, not unlike that of sour cream. Heat did not properly coagulate it, but made it somewhat turbid and milky. By further evaporation, the fluid became more and more inspissated, but no opake coagulum was formed. That, however, albumen was present, will clearly appear by the following experiments: the inspissated animal substance having been diluted with water, and filtered, the clear liquor, on adding nitric acid, let fall abundant white flakes. Concentrated sulphuric, or muriatic acid, produced dense white precipitates, which disappeared by copious dilution, and re-appeared on adding nitric acid. When concentrated nitric acid was added to this serous fluid, a firm, perfectly white coagulum was instantly formed, which was not readily dissolved again on adding cold water, but dissappeared more quickly on boiling.

The dilute sulphuric and muriatic acids produced no white flakes*; but the dilute nitric acid did throw down a white precipitate, which disappeared on boiling. The acetic acid did not produce any coagulation or precipitation, on account, no doubt,

* The same effects, nearly, take place with common albumen: dilute acids, therefore, are a bad precipitant, and therefore an uncertain test of albumen.

of the dilute state of the albumen; for albumen ovi, or undiluted serum, are strongly coagulated by acetic acid.

A solution of caustic potash did not impair the transparency of this fluid, nor did it disengage from it any perceptible ammoniacal vapour. It did not appear to contain the least vestige of gelatine.

The proportion of solid matter contained in the serosity of this species of chyle was ascertained by evaporating a known quantity of this fluid in a water bath, till it ceased to lose any weight by further exposure. One hundred parts of the fluid, thus treated, yielded 4.8 parts of solid matter, which appeared in the form of a yellowish mass, and was very deliquescent. In some other specimens the proportion of solid matter was more considerable, though the specific gravity, as may be seen in the annexed Table, appears to be remarkably uniform; 9,5 parts in 100, was the greatest quantity of solid matter obtained.

Examination of the chyle from animal food.

This specimen of chyle exhibited properties similar to the former, except as to the following circumstances: instead of being nearly transparent and colourless, it was white and opake, like

cream *. The coagulum was also white and opake, and had a more distinct pink hue, with an appearance not unlike that of very minute blood-vessels. The proportion of the fluid to the coagulated part was as 100 to 46½. The coagulum, as in the former instance, gradually yielded further quantities of serous fluid, till nothing remained but a small quantity of a pulpy opake substance, in appearance somewhat similar to thick pus, and containing minute globules, besides the red particles above noticed. This residue of the coagulum became, in the course of three days, quite putrid, whilst that obtained from vegetable chyle in a similar manner, had not yet begun to undergo that process. Here also, the precipitate produced by nitric acid, was more imperfectly redissolved by heat and dilution, than in the other specimen; and the addition of potash occasioned a much more considerable evolution of ammonia.

The properties of the serous portion of this specimen of chyle, also differed in some respects from those of the former. On standing, a white opake creamy substance rose to the surface †.

* Neither of the animals had been allowed to drink any milk.

† This substance, when recent, is very analogous to cream, both in its appearance and properties. It is capable of acquiring an acescent smell, but does not appear inclined to putrefy. If separated and preserved, it gradually thickens and assumes the consistence of soft fat or butter, and in this state can be preserved for a great length of time.

A sub-

Heat rendered it rather more turbid than the other. The precipitates formed by the concentrated acids, were, as in the former instance, re-dissolved by ad-

A substance precisely similar, and obviously derived from the chyle, sometimes appears on the surface of blood obtained by bleeding. It gives to the serum a milky appearance at first; but soon afterwards the creamy matter gradually separates and rises to the surface, leaving the clear serum underneath. This separation sometimes requires two or three days to be completed. I inclosed in a tube about two years ago, some of this creamy substance found on the surface of the blood of a diabetic patient, and sent a specimen of it to Professor Berzelius, at Stockholm, who found it to consist of albumen mixed with a portion of true cream or butter, the albumen having not yet passed to the caseous state; some of the same specimen, however, which I have preserved till now, appears to have undergone the caseous change; it has assumed the consistence, and in some degree the unctuosity of butter; but when heat is applied to it, instead of melting like butter, it dries and hardens, and ultimately burns with a smell not unlike that of cheese.

From a number of observations which I have made during the last few years, I am induced to think that the appearance of creamy matter in the serum is much more considerable and much more frequent in animals feeding entirely, or chiefly, upon animal food, than in those which feed on vegetables. This may in part depend upon the comparative rapidity with which carnivorous animals devour their meals, in consequence of which more chyle may be thrown into the blood than can be immediately assimilated to it. In man, this appearance may occur under various plans of diet; but I have observed it in the blood of no less than three successive diabetic patients, who were living upon animal food alone; whilst in a fourth diabetic, whose diet was not so strictly attended to, the creamy matter did not appear. I once also had an opportunity of comparing the properties of the serum of a horse with those of the serum of a dog, which had been fed for a whole week upon animal food alone, and had drunk no milk,

ding water; but the solution always remained milky, whether boiled or not, apparently from an oily substance floating on the fluid. On adding to it potash, likewise, the mixture remained turbid, instead of being transparent, as in the case of the vegetable chyle. The fluid did not contain the smallest quantity of gelatine. At the end of ten days it was quite putrid.

The quantity of solid matter contained in this fluid, was 7 parts in 100. In other respects the residue resembled that of vegetable chyle.

Result of the destructive distillation of chyle.

A small quantity of chyle being evaporated to

The horse's serum was and remained transparent, whilst the dog's serum was milky and threw up a considerable quantity of the creamy substance. The specific gravity of the former was 1025.9; that of the latter 1024.6. They contained, the one 8, the other 7 parts of solid matter, in 100 parts of the serum. The dog's serum was beginning to putrefy at the end of three or four days, though in frosty weather, whilst in the horse's serum this process did not begin till two months after. I should not omit to mention however, that Mr. Vauquelin, who has given a valuable analysis of the chyle of the horse, (Annales de Chimie, Vol. LXXXI, and Thomson's Annals, Vol. III.) generally found it to contain some of the creamy substance in question. Mr. Vauquelin's dissertation on the subject, contains a short but comprehensive sketch of the various opinions which have been successively entertained on the nature of chyle.

dryness, and the residue being heated in a glass tube, it immediately turned black, and frothed abundantly; it then emitted first a whitish, and soon afterwards a brownish vapour, the former of which was moisture, with carbonat of ammonia which crystallized in cooling, and the latter a heavy fixed oil. The weight of the oil amounted to about one-third of that of the mass. The black carbonaceous residue which remained in the tube, afforded some saline substances, amongst which iron was easily detected by prussiat of potash. The charcoal, when separated from these, amounted to about 3 parts in 1000 of the chyle under examination. The results just described were obtained from chyle produced by vegetable food. Chyle produced by animal food, treated in the same manner, presented similar results, but appeared to yield a greater proportion of carbonat of ammonia, and of oil; and left a much smaller quantity of carbonaceous matter.

Examination of Chyme.

The only specimen of chyme which I have had an opportunity of examining, was obtained from a turkey which had fed upon vegetable food alone. It appeared in the form of a homogeneous brownish opake pulp, having the smell which is peculiar to poultry. It was scarcely fluid enough to flow out of a wide-mouthed phial; but on shaking the bot-

tle, it fell out in large clots, or glairy masses somewhat like the albumen ovi. It had no decisive acid or alkaline properties, though by its effect on litmus it appeared rather inclining to acidity, differing in this respect from chyle, which is slightly alkaline. At the end of twelve days it was quite putrid.

Upon being evaporated to dryness, a residue was obtained which weighed nearly one-fifth of the whole. During this evaporation a strong smell of poultry was emitted, and a leathery pellicle formed on the surface. Some of the chyme being macerated in water and thrown into filter, and a mineral acid being added to the clear solution, a copious flocculent precipitate was formed. Heat alone also produced an abundance of flakes. The whole of this coagulable substance being separated from the solution, by boiling it with corrosive sublimate, the filtered liquor did not yield the least precipitate on adding solution of galls.

The dry residue obtained from the evaporation of chyme, being thoroughly burnt in a platina crucible, the remaining carbonaceous matter amounted to about 12 parts in 1000 of the chyme under examination, besides various saline matters, which were found mixed with the charcoal, in the proportion of about 6 parts in 1000 of the chyme, amongst which the presence of iron, lime, and an alkaline muriat, was clearly ascertained.

Acetic acid, unassisted by heat, had the power of dissolving the chyme almost entirely; and prussiat of potash threw down small white flakes from this solution, a circumstance which affords additional evidence of the existence of albumen or fibrine in the chyme.

It may be proper to observe here, that this mode of precipitating albumen (which is described by Berzelius in the Medico-Chirurg. Transact. Vol. III. p. 202), removes any source of error which might arise from the circumstance of certain vegetable substances, being precipitable from their solutions, by the mineral acids. I was desirous of obtaining satisfactory evidence of the presence of albuminous matter in chyme, formed from ingredients which contain none, as this puts in the strongest light, the wonderful chemical powers of the digestive organs. This almost instantaneous conversion of food into albumen, and soon afterwards into fibrine, fatty matter, and red particles, with the constant appearance of certain salts, all these substances bearing certain uniform proportions to each other, may be placed amongst the most striking wonders of the animal economy; and as these changes are obviously chemical, it is to be hoped that our more enlarged views of chemistry, and our improved methods of cultivating that science, will soon throw new lights upon this important part of physiology.

The following is a tabular view of the results above detailed.

	Specific gravity.	Solid matter in 1000 parts, including saline matter.	Saline matter in 1000 parts.	Charcoal in 1000 parts.
Exp. 1. Chyle from animal food		70		
Exp. 1. —— from vegetable food		48		
Exp. 2. Chyle from animal food	1021.5	95	9.2	1
Exp. 2. —— from vegetable food	1021.5	73	9.2	3
Exp. 3. Chyle from animal food	1022	74		
Exp. 3. —— from vegetable food	1022	78		
Chyme from vegetable food		200	6	12

Upon the whole, in the present imperfect state of the inquiry, the following conclusions present themselves:

1. The specific gravity of the serous portion of chyle appears to be between 1021 and 1022, whether formed from animal or from vegetable food.

2. The quantity of solid residue, comprehending both saline and animal matter, left by the evaporation of chyle, at the heat of boiling water, may generally be stated to vary between 50 and 90 parts in 1000.

3. The quantity of saline matter appears to be about 9 parts in 1000, being the same proportion of salts which is found in all other animal fluids *.

4. The chyle from the vegetable food appears to yield by analysis, about three times as much charcoal as that from animal food.

5. The chyle from animal food is much disposed to putrefy, and generally begins to undergo that change in three or four days; whilst that from vegetable food can be kept for weeks, or even sometimes for months, without undergoing putrefication.

6. The coagulum of chyle is more inclined to putrefy than the serous part.

7. The chyle formed from animal food alone is always milky, and on standing, an unctuous white creamy substance collects on the surface; its coagulum is opake, and has a pink hue.

8. The chyle from vegetable food is commonly transparent, or nearly so, like common serum; its coagulum is nearly colourless, like an oyster; and no creamy substance rises to the surface.

* See my paper on Dropsical Fluids, in Vol. II. of these Transactions.

9. The principal ingredient of the animal matter of chyle is albumen; but, besides albumen, chyle, especially when derived from animal food, contains globules of an oily substance, which bears a strong resemblance to cream.

10. By the destructive distillation, chyle gives, first a liquor impregnated with carbonat of ammonia, and afterwards a heavy fixed oil. The chyle from animal food yields a greater proportion of either of these products; but the residue, whatever the mode of analysis be, contains less charcoal than the chyle from vegetable food. Iron is readily detected in the residue of chyle, mixed with the salts and carbonaceous matter.

11. Chyme, from vegetable food, yields much more solid matter than any of the other animal fluids; though it appears to contain rather less saline matter.

12. Chyme contains albumen.

13. It yields about four times as much charcoal as chyme from vegetable food.

14. Neither chyle nor chyme contain any gelatine.

FURTHER OBSERVATIONS

ON THE

LIGATURE OF ARTERIES.

By BENJAMIN TRAVERS, Esq. F.R.S.

SURGEON TO ST. THOMAS'S HOSPITAL,

AND

THE LONDON INFIRMARY FOR DISEASES OF THE EYE.

Read July 18, 1815.

IN a paper which I had two years ago the honour of reading to the Society, I suggested the temporary application of the ligature as a simplification of the practice employed by surgeons for obliterating the larger arteries.

If the arrestation of the column of blood for a time sufficient to admit of its becoming a solid, constituted the security to be relied upon, or if, as formerly supposed, the effect of the ligature were confined to the simple coaptation of the sides of the vessel for a time sufficient to induce their adhesion, the propriety of interfering with it might be questionable. But the facts being established beyond controversy that the round ligature divides the inner tunics, and that the wound

so produced is healed by a process of adhesive inflammation, it seemed probable that the serviceable operation of the ligature was limited to a period far short of that, in which its liberation from the vessel by an ulcerative process could be accomplished.

It is now well known, that the result of tying an artery, and removing the ligature instantly, is a wound or fissure of the middle and internal coats, which is soon occupied by lymph, and gradually obliterated by cicatrization, the vessel remaining pervious. But if three or four ligatures are applied contiguous to each other, forming as many distinct fissures, the lymph is effused in such abundance as to project into the cylinder, and obstruct the passage of the blood. It has been once or twice observed after the application of a single ligature, that the consequent deposition of lymph was more abundant, and projected in the form of a band from the fissure into the area of the tube; and a single ligature applied for one, two, or three hours, has in some instances presented similar evidence of an increased inflammatory action.

In one experiment in which the ligature had been removed *two* hours after its application, I found the vessel blocked up with lymph mingled with coagula of blood, at the end of fifteen hours.

In a second, after the removal of the ligature

in *one* hour, the same result was obtained upon examination at twenty hours.

In a third experiment, the ligature having been applied for *one* hour, I found the fissure complete but without any appearance of a healing process at the end of thirty hours.

In a fourth, the vessel which had been tied for *one* hour, was pervious to the blood, which escaped freely on wounding it, after the lapse of sixty-five hours.

It appears therefore that much uncertainty prevails concerning the effect of the ligature applied for a minute or an hour: that the mere infliction of the wound is not commonly followed by an inflammation more than sufficient to heal itself, nor does the addition of pressure for an hour or two commonly increase its activity in a marked degree. The exceptions therefore which have occurred must be referred to the difference of organic sensibility, or of temperament and vital power in different animals.

The obstruction of an artery may, I believe, be regarded as an invariable consequence of the application of a ligature for six hours, in the species of animals which were the subjects of these experiments. It is an indispensable condition however, that the mode of applying the ligature be such as to insure the division of the inner tunics, a condition

which it will be more difficult to prevent than to execute, if the ligature be of a proper form. If one end of a ligature of Dutch twine be doubled, so as to form a noose under the single knot, it keeps its seat in the fissure which is formed for its reception with perfect security. This is the description of ligature which I have employed in the experiments about to be related. It is represented in *Plate* V. *Fig.* 1. By cutting the ends of unequal length they are easily discriminated; and by drawing the noose end, the ligature comes away with the greatest facility, and without any disturbance of the parts. It acquires no additional security from what is called the surgeon's knot, or from a double knot; and they are objectionable because less easily removed.

In some former experiments on this subject several circumstances occurred, which impressed my mind with the necessity and importance of further inquiry. I was not informed with certainty if in the vessel, in which lymph was copiously deposited, and no coagulum of blood was present, the circulation was actually arrested. In a case in which the ligature had been removed at six hours, and from the presence of a cylindrical coagulum of blood it was evident that the obstruction was complete, I was unable to say whether the circulation had been arrested by lymph effused prior to the removal of the ligature; or whether it had been restored and only gradually

obstructed by lymph effused subsequently to the removal of the ligature. The probability that the impetus of the circulation, once re-established, would interrupt the adhesive process in the early stage, and prevent or remove the deposition of lymph, seemed to favour the former opinion; while on the other hand, the time allowed for the residence of the ligature appeared insufficient for the actual obstruction of the vessel. The state of the pulse beyond the ligature, which might be naturally expected to throw some light upon this question, afforded none, for it continued in the carotid artery even during the application of the ligature, and was more or less, as a branch or branches, proceeding from the artery above the ligature, were nearer or more distant; although a slight remora, as well as a diminution of fulness in the stroke, was always perceptible by laying a finger on either side of the ligature, so as to compare the pulse above with that below it. For these reasons I determined, in prosecuting these experiments, to place a second ligature upon the vessel an inch further from the heart, in order to arrest the refluent blood, and after freely wounding the vessel with a lancet in the interspace, to remove the first or noose ligature.

To ascertain the earliest period at which the ligature might be removed, and the artery wounded without hemorrhage, was the object of the following experiments.

EXPERIMENT I.

A single noose ligature was made upon the carotid of a horse. At the end of six hours I placed another ligature upon the vessel, an inch or somewhat more above the former. I then half divided the vessel in the interspace, and drew off the noose ligature without the slightest disturbance of the parts. The blood instantly jetted out in a full stream. The first jet was serous, so as scarcely to stain my linen which was besprinkled with it.

Examination. The internal tunic was completely divided and the fissure partially filled up by soft lymph, which projected a little into the vessel. The deposition had slightly thickened the coats of the artery at this part.

EXPERIMENT II.

The ligature was removed at nine hours. The hemorrhage was instantaneous and apparently uninterrupted.

Examination. The fissure was filled by lymph, projecting equally in the form of a narrow layer between its edges. *Plate* V. *Fig.* 2.

EXPERIMENT III.

Ligature removed at twelve hours. No blood issued. In a quarter of an hour afterwards the

animal was knocked down, and the parts removed.

Examination. Complete obstruction of the tube. A strong circular cord of lymph filling the fissure of the inner coat, supported by a conical coagulum of blood above and below it, the former half an inch, the latter an inch long. Considerable effusion of lymph between the internal and middle coats, to the extent of the coagulum, by which the tunics were much thickened, and the cylinder contracted. *Plate* V. *Fig.* 3.

EXPERIMENT IV.

Ligature removed at 20 hours. No blood escaped, and the obstruction appeared complete. The animal was knocked down ten minutes after the removal of the ligature. The blow was misplaced, and he fell, after much staggering, with great force on the wounded side. The concussion was instantly followed by a copious hemorrhage from the wound.

Examination. The fissure of the ligature occupied by lymph, which had evidently coalesced from the opposite sides of the vessel and obstructed it, formed a septum which was imperfect, as if ruptured. A string of coagulated blood three inches long was connected with the lymph inferiorly. Above, a broader clot, half an inch long,

extended from the lymph into the wound, and must therefore have been recent. The tube was thickened in its walls by effusion between its coats, and thus narrowed in the vicinity of the ligature. *Plate* V. *Fig.* 4.

EXPERIMENT V.

Ligature removed at twenty-four hours. No escape of blood upon its removal. The animal walked about the yard; and in ten minutes was polled, but was only stunned by the blow. After falling he struggled and threw his head violently from side to side, when the blood rushed out impetuously as before from the half divided vessel.

Examination. The lymph in the fissure presents an appearance very similar to that of the preceding experiment, viz. a ruptured septum. No coagulum of blood was found, except a short and recent one, extending from the breach of the septum into the wound, as in the former experiment, and shewing the obstruction which the lymph had opposed to its passage.

EXPERIMENT VI.

I took the precaution of suffering the animal to survive the operation of removing the ligature and wounding the vessel, for six hours. This was done at sixteen hours. No hemorrhage en-

sued. The animal was killed in twenty-two hours.

Examination. The vessel was obstructed by a complete membranous septum of lymph, some particles of coagula lay beneath the septum and adhered to it, but no cylindrical coagulum of blood had formed.

EXPERIMENT VII.

From the last result, I thought it possible that the ligature applied for six hours, might cause the obstruction of the vessel in twelve.

The ligature was drawn off in six hours, and six hours after the artery was divided. The blood flowed freely, but in an evidently diminished column, and with abridged saltus.

Examination. The lymph was deposited in a mass occupying two thirds of the area of the vessel. It was however insufficient to obstruct the passage of the blood.

EXPERIMENT VIII.

I wished to know if the obstruction would be equally complete in the truncated artery, in the same space of time as was allowed in Exp. 3.

A ligature was placed on the carotid of a horse;

and while the vessel was held between the fingers of an assistant, one inch below the ligature, the artery was divided and the noose ligature applied to the inferior extremity. In twelve hours the ligature was withdrawn. No bleeding ensued, and at thirty hours the animal was killed.

Examination. The fissure was filled by lymph undistinguishably blended with a clot of blood, projecting one fourth of an inch above it, and reaching downward to the aorta. A considerable branch was occupied by the coagulum; but it did not stop at it, as usual. *Plate* V. *Fig. 5.*

From these experiments the following conclusions may be drawn.

1st. No material obstruction is opposed to the passage of the blood upon removing the ligature at a period of six or even of nine hours from its application, and consequently its ultimate obstruction under these circumstances must be referable to the gradual completion of the adhesive process.

2dly. The residence of the ligature for a period of six hours affords direct evidence of an inflammatory action in the deposition of lymph between the divided tunics; which deposition is more abundant at nine hours, and sufficient for the obstruction of the vessel in twelve; pre-

senting the form of an interstitial cord between the lips of the fissure, and continuous with it, a membranous septum extending across the vessel *.

3dly. The septum of lymph is formed prior to the coagulum of blood, and in all cases of ordinary circulation is, of itself, adequate to the prevention of hemorrhage; but under a sudden extraordinary impulse of circulation, or a violent concussion *ab externo*, is liable to be ruptured and give passage to the blood. If however an interval of six hours be suffered to elapse after the removal of the ligature, the same violence is not followed by hemorrhage, although no coagulum of blood be formed.

4thly. The cylindrical coagulum of blood supporting the septum of lymph is an additional preventive to hemorrhage under extraordinary impulses. It may be formed at twelve, or may not be formed at twenty-four hours; the nearest collateral branch being equally distant and the obstruction equally complete in both cases.

5thly. A period of twelve hours is sufficient for the obstruction of the vessel by lymph, so as to admit of the removal of the ligature, and the

* This septum is concealed by the cylindrical coagula of blood which adhere to it intimately.

wound or division of the artery without danger of hemorrhage.

6thly. The addition of the pressure of the ligature to the wound which it inflicts, accelerates the adhesive process; thus within a certain limit, the earlier the removal of the ligature, the more remote is the period of obstruction. If applied for six hours, it is unsafe to open the artery in less than twenty-four hours; if for twelve hours, the artery may be opened immediately.

7thly. The ligature applied for twelve hours upon the truncated artery, is equally safe as upon that which is continuous.

8thly. The coagulum of blood is larger and more extensive in the truncated than in the continuous artery, and is not bounded by collateral vessels, but extends into them; probably owing to the feebler propagation of the heart's impulse along the divided and retracted vessel, and the consequently greater quiescence of the fluid blood.

The experiments next to be related, give the operation of the compressor, and were undertaken with a view to determine its merit as a surgical instrument, comparatively with the ligature. Professor Assalini of Milan, who lately

visited this country, entertains a preference for the practice of compression in the operation for aneurism. He had employed it with success in three cases of popliteal aneurism *.

Dr. Crampton, Surgeon-General of Ireland, and Mr. Dease of Dublin, have likewise used compression for a limited period with success, in two recent cases of popliteal aneurism, of which I do not wish to anticipate the details.

These circumstances I mention, as they give additional interest to the investigation.

EXPERIMENT IX.

The compressor of Assalini was applied to the carotid of a horse, and slackened at the end of sixteen hours, when a free hemorrhage ensued from a wound with a lancet half an inch beyond the compressed part.

Examination. There was no breach of the inner coat, but a deep indentation of the walls of the vessel was observed where the compressor had been applied, upon which was a very thin pellicle of lymph, and a slender clot of blood was contained

* See the Appendix to Mr. Hodgson's valuable "Treatise on the Diseases of Arteries and Veins," for an account of the instrument and the operations of Professor Assalini.

in the portion of the vessel inferior to that which had been compressed.

EXPERIMENT X.

The compressor was applied for thirty hours. The indentation was conspicuous; but as it was evident that no obstruction had taken place, I did not open the vessel before death.

Examination. The indentation had the appearance of a discontinuity of the inner coat, of the breadth of the compressor, but no læsion was discernible. A slight blush of inflammation appeared about the indented part.

Plate VI. *Fig.* 1. very exactly represents the preparation.

EXPERIMENT XI.

The compressor was applied for twenty-five hours. In this experiment Professor Assalini accompanied me. The animal was suffered to live a hundred and twenty hours.

Examination. A mass of lymph mixed with much blood exactly occupied the compressed part of the cylinder, and adhered firmly to the internal tunic. The external coat of the vessel was sloughy and ragged where the compressor had been applied. *Plate* VI. *Fig.* 2.

EXPERIMENT XII.

The compressor was applied for twelve hours, and the animal suffered to live ninety-eight. Owing to the vicinity of an anastomosing branch, the pulse above the compressor was comparatively strong during the experiment.

Examination. The artery was traversed by a septiform layer, and filled by a soft bed of lymph mixed with blood, and adhering closely to its sides, of the extent of the indentation. The cylindrical clot of blood was an inch long, but had not adhered to the lymph, and was lying loose at some distance below it, when the vessel was opened. *Plate* VI. *Fig.* 3.

EXPERIMENT XIII.

The following were parallel experiments.

The compressor was applied to the carotid of a horse for six hours, and the animal permitted to live for seventy hours. On its removal the part of the vessel to which it had been applied resumed its cylindrical form, but felt rigid, and as if contracted to half its former bulk. At the end of seventy hours the vessel was freely wounded with a lancet, as before described, and the hemorrhage was profuse.

Examination. The cellular substance was loaded with blood. The artery was less contracted at the compressed than at the wounded part. A thin spiral coagulum of blood, an inch long, adhered at its basis to the sides of the compressed part, having its apex turned towards the heart. It was sufficient to shew that some impediment to the passage of blood had existed. Contiguous to this was a narrow and recent clot of blood extending to the wound made by the lancet, which was in the form of a crescent; and by its contraction gave a bulged or pouch-like appearance to this part of the artery. *Plate* VI. *Fig.* 4.

EXPERIMENT XIV.

At the same time, and in circumstances as nearly similar as possible, a ligature was applied to the carotid of a horse for six hours, and the animal permitted to live seventy hours. The part retained the form which the ligature had given it, that is, it was strictured at the division of the internal tunics. At the end of seventy hours the artery was wounded as in the former experiment; no hemorrhage ensued.

Examination. A strong round cord or band of lymph filled the fissure of the artery; the inferior coagulum of blood of the full size of the vessel extended to the subclavian artery, and the upper, likewise of the size of the vessel, was one inch

long. The lancet wound was near the extremity of this coagulum. *Plate* VI. *Fig.* 5.

EXPERIMENT XV.

I wished to know the effect of leaving the compressor upon the vessel, and the time in which it was liberated by ulceration.

The compressor was screwed home upon the carotid of a dog, and left upon the vessel. In the night between the fourth and fifth days it fell off. The slough was not retained between the teeth of the instrument. On the tenth day the animal continued well, and the wound was healed in a fortnight.

Examination. The artery was completely obliterated where the compressor had been applied. The extremities were solid and conical, being filled with lymph which exhibited abundant vascularity after a fine injection.

These experiments admit of the following inferences.

1. The compressor, like the ligature, effects the obliteration of an artery by exciting inflammation upon its internal tunic.

2. The operation of the compressor differs from

that of the ligature in not producing a læsion of the inner coats, and therefore exciting inflammation upon a continuous surface.

3. The operation of the compressor is slower than that of the ligature. The former applied for thirty hours, leaves an inflammatory blush or a pellicle of lymph upon the inner coat, while the latter applied for only twelve hours, is found to have obstructed the vessel by lymph: again, the former applied for six hours has produced no apparent sign of the adhesive process, when examined at the end of seventy hours; whereas the latter applied for the same time, and examined after the same interval, is found to have effected the complete obstruction of the artery.

4. The effusion of lymph after the application of the compressor, where the obstruction of the artery has been accomplished, is *en masse*, to the extent of the part compressed, which is marked by a deep indentation of the walls of the vessel to which the lymph firmly adheres. The mass is of least firmness in the centre, where it is mixed with the red particles of the blood.

5. The application of the compressor for a period of twenty-five hours is followed by a sloughy state of the external coat of the vessel.

6. The compressor left upon the artery is li-

berated by ulceration in about four days; the adjoining portions of the vessel, being previously secured by the adhesive process, present solid conical extremities. The effacement of the compressed portion of artery is complete; and the appearances correspond precisely with those produced by the application of two ligatures, distant half an inch, more or less, upon a portion of artery denuded of its sheath, in which the interval sloughs and disappears*. I may observe, that where the vessel is left undetached from its sheath in the interval of the ligatures, the tube remains, and although shrunk, continues to be nourished.

7. The organization by blood-vessels, of the lymph obstructing the tube, is distinctly visible in a fortnight after the application of the ligature or compressor.

It appears then that the operation of the compressor and ligature, applied each for one minute, is that of simple pressure opposed to simple wound. If they are applied for a longer time, it is simple pressure opposed to wound and pressure com-

* In a recent case of iliac aneurism, for which the external iliac artery was tied by my colleague Mr. Henry Cline, with perfect success, the single ligature, which came away on the 17th day, brought with it a slough of a cylindrical portion of the artery, about a quarter of an inch long, the ligature encircling it in the middle

bined. It is undeniable from these experiments that the latter is a more powerful instrument for effecting the object in view; and this result of the combination is equally conformable to reason and to experience.

The following observations, which these and similar experiments have afforded me the opportunity of making, are rather general than referrible to individual examples.

The union of the sides of a vessel is never immediate or by direct contact, but by the medium of lymph effused. The ultimate operation is the removal of this lymph and the gradual conversion of the vessel into a cord, by a process of absorption.

After the employment of either the ligature or compressor for a time only sufficient to ensure the adhesive process, the separation of the vessel by ulceration does not ensue.

The conical form of the extremities of a vessel which has been severed by ulceration is the effect of the cicatrising process, and is not observed where that has not taken place. In the vessel divided by ulceration, and simply plugged by a coagulum of blood, there is no contraction of the mouth of the artery, consequently it is the result

of the adhesive process, and not of the muscular action of the vessel, which takes place upon a direct division.

Where the cylindrical coagulum of blood is formed, it adheres at its basis to the lymph sealing the vessel, and generally for a small space to the sides of the vessel. It is therefore encrusted or coated with lymph: this lymph, is, I suspect, separated mechanically from the red particles which are accumulated in the interior of the clot, as in a basin, and should not be considered as the product of inflammation. The more the uniting band of lymph, or *couvercle*, as it has been called, is distinct from, and independent of the coagulum of blood, or *bouchon*, the more certainly is the vessel obstructed by the adhesive process.

The effect of the ligature is more satisfactory than that of the compressor in this respect. The former presents a more considerable effusion of pure lymph in the form of a distinct membranous septum. The latter exhibits a mass of lymph and blood mixed together, as if the last had been entangled in its passage. The septum is produced from the cleft or fissure formed in the coats of the vessel, and the more abundant supply of pure lymph is derived from the cut surface; the obstruction is, however, in all cases formed chiefly by lymph, for the circulation will be continued by

the side of a mass of lymph not filling the cylinder, or through a central opening in a septum of lymph.

Where the ulcerative process is to be gone through, the compressor and ligature do not differ in their operation. The principal difference is at the commencement of the operation. Thus the ligature having already divided the inner tunics by its application, the process of adhesion commences at a much earlier period. In the remainder of its operation it has to do with the outer coat exclusively. The fissure looks like a provision for the independent carrying on of the adhesive or defending process. The compressor on the other hand, encircling the entire tunics, and not directly affecting their integrity, consequently ulcerates them progressively, and as the adhesive process begins later, its safety must depend upon the ulceration of the entire cylinder being later accomplished.

The time at which the clot of blood is formed seems to depend on circumstances not very easy to be ascertained. After obstruction for a period of forty-eight hours, I have invariably found it, unless a branch was contiguous to the obstructed part, which however does not always prevent, though it retards its formation. Where the compressor had been applied for thirty hours, there was no appearance of it. It is not always limited by the opening of the nearest branch, and fre-

quently does not extend so far. A slender string or filament of cruor, the incipient coagulum, is generally found where obstruction has taken place; and some small coagula of blood are often mixed with the lymph by which the vessel is obstructed.

The earliest period at which I have seen it formed is one of twelve hours. (Experiment 3.) In experiments 4, 5, and 6, although the animals lived 20, 22, and 24 hours,—the obstruction was equally complete, and the branches were equally distant,—no coagulum had formed. In Experiments 11, 12, 14, and 15, in which the obstruction was complete, and the animals were suffered to live for seventy hours and upwards, the coagulum was present. Its importance is strikingly manifested by a comparison of the results of Experiment 3, with Experiments 4 and 5. Had the clots been fully formed in the latter instances, I feel assured that the hemorrhage which took place in the last struggles would not have occurred. Why the coagulum was not formed, when the life of the animal was extended to six or eight hours longer than in the first-mentioned experiment, I am at a loss to explain. I have already offered a conjecture concerning the unusual size and extent of the coagulum formed in thirty hours in Experiment 7. The validity of the lymph-plug in the absence of a coagulum under ordinary circumstances is inferrible from Experiments 4, 5 and 6,

and that the effusion of lymph is always prior to the coagulation of blood in the vessel, is sufficiently demonstrated *.

It has been supposed that the vicinity of a branch to the ligature of an artery, as it interfered with

* Mr. Hunter supposes that a disposition to coagulate is given to the blood by the inflamed state of the vessels: and thus he accounts for the coagulum of blood in the artery of a mortified limb. Dr. Thomson refers this phenomenon to the closure by adhesion of the mouths of branches issuing from the trunk, and the stoppage thus put to circulation. I have, however, seen the coagulum occupying the branches as well as the trunk, and presenting a mould of the ramifications. Petit, O'Halloran, and others, noticed the extension of the coagulum into the living portion of the artery, an observation now familiar to most surgeons. Dr. Thomson has observed that in many instances this coagulum was absent where no hemorrhage had taken place; the extremities of the vessels were closed by the adhesive inflammation which had occurred prior to the separation of the living and dead parts. In other cases the extremities of the arteries of stumps were found open, from which no bleeding had occurred during the spontaneous separation of the limb; and hence Dr. Thomson is of opinion that the coagulation of the blood in the arteries takes place less frequently in mortification than has been supposed. My opportunities of examining the vessels of stumps have disposed me to the general belief that the blood coagulates in the vessels after mortification, but they have not been sufficiently numerous to enable me to say more on the subject. I have attributed the circumstance not to any change in the circulating blood, but to the arrestation of motion in the dead artery in which the coagulation begins, and having once begun, of course extends through the living vessel, which is a *cul de sac*, up to the next large branch or bifurcation, as in tied arteries. The coagulum however is not so compact and firm as after a ligature, but contains a larger proportion of red particles to the lymph.

the coagulation of the blood, rendered the vessel insecure; and I have often heard of a bleeding from the femoral artery where the ligature had been placed below the origin of the profunda. I examined a preparation some time ago, in which a ligature had been placed upon the external iliac between the epigastric and circumflex-iliac arteries, and having been in contact with the former at the angle which it makes at its origin from the iliac, ulceration had taken place, and the bleeding had proved fatal. There was no coagulum formed in the iliac trunk, though the operation had been performed several days before, the circulation through the epigastric having continued. But the lymph-plug at the seat of the ligature on the iliac artery was complete, and the blood had not escaped from it, but had made its way through the ulcerated orifice in the epigastric *.

* I examined the stump of a man whose leg I had amputated above the knee ten days before: the femoral artery was tied with a silk ligature, the ends of which had been cut, agreeably to the suggestion of my friend Mr. Lawrence, close to the knot. The mouth of the vessel was contracted and occupied by a lymph plug, firmly adhering at its circumference. A considerable branch opened at a quarter of an inch or less above the ligature, and no coagulum of blood had formed. The ulceration of the vessel by the ligature was considerably advanced, but the latter was not loose enough to come away with a prudent exertion of force. The portion of the vessel which had been strangulated by the ligature was a slough. The living extremity of the vessel was well defended by the adhesive inflammation which had thickened and rendered compact the surrounding cellular substance, although the face of the stump was in a state of profuse

The fluidity of the blood does not therefore in any degree prevent the adhesive process, as is shewn also in the indirect obstruction effected by the ligature applied for six hours, or the compressor for twelve. But if accidentally violence is done to a stump, if the adhesive process is languid, or if the sealed extremity of the vessel is included in a slough, the coagulum of blood may avail to prevent hemorrhage until the granulating process is re-established upon the surface *.

and unhealthy suppuration, and pus was abundantly secreted in the cellular interstices of the muscles of the thigh and beneath the integument.

* A man whose leg was amputated in St. Thomas's Hospital, had a profuse hemorrhage after the separation of the ligature, and after repeated bleedings and ineffectual attempts to suppress them, the artery was exposed by a lateral incision, for a space of two inches above the face of the stump, and ascertained to be thickened by an inflammation of its coats. The actual cautery was applied to it, at the highest, which appeared to be the soundest part, since it was evident the ligature would have little if any chance of effecting its purpose upon so diseased a vessel. Upon the casting off of the eschar, which filled the wound, it was found that granulations had covered the vessel, and a very inconsiderable bleeding followed, which ceased upon the application of linen rags kept constantly moist with cold water. In this and similar cases, which are not uncommon, the process of arresting hemorrhage is reversed. The slough however produced answers the purpose of the ligature as a present stay to the blood, as it cannot separate until the cellular substance has shot up in granulations over the mouth of the vessel, and has either dislodged it, or set it free. A coagulum of blood may in the interval have taken place within the vessel, and afford additional security, although the internal plug of lymph, which is the sign of a healthy adhesive action, is altogether deficient, from the

In contemplating the removal of the ligature at a given time, it becomes essential to ascertain if this can be done with equal security when a branch is contiguous as when at a distance. With this view I made the following experiments.

EXPERIMENT XVI.

The carotid of a horse was tied by a noose ligature immediately above a considerable branch going to the top of the trachea and larynx. It was drawn off, and the vessel divided in sixteen hours, when no blood escaped. In twenty-four hours the animal was killed.

Examination. The obstruction was of lymph, some particles of coagulum adhering to it inferiorly. No cylindrical coagulum had formed.

EXPERIMENT XVII.

The femoral artery of a dog was tied below the profunda; the ligature removed, and the artery divided at forty hours; no bleeding ensued. The wound healed speedily. The animal was killed at the end of a month.

incapacity of a diseased artery for that action. Sponge tents and compresses confined upon bleeding vessels which cannot be conveniently secured by the ligature, act in the same way as eschars in suppressing hemorrhage, and are liberated by a similar process. But where the vessel is healthy, it is closed by the adhesive process upon its interior surface, as well as covered by granulation.

Examination. The artery was obliterated in the interval of the ligatures. The lymph filling the cone-like terminations of the vessel, was shewn to be beautifully vascular by injection.

EXPERIMENT XVIII.

A noose ligature was applied at the same time to the carotid, and femoral artery immediately below the profunda, of a strong healthy dog. In thirty hours the second ligature was applied to each artery, and the carotid first divided between the two, no hemorrhage ensued. The femoral artery was then divided, but while undergoing this operation the animal struggled violently, and the blood flowed copiously from the carotid, although without saltus. The bleeding ceased in about two minutes, and the animal threw himself upon the ground, when I supposed him exhausted by the loss of blood. Not the slightest hemorrhage took place from the femoral artery, nor did it recur from the carotid: on the following day the animal ate and drank as heartily as if in perfect health, and has since continued well.

EXPERIMENT XIX.

A ligature was applied at the same time to the femoral artery below the profunda, and to the carotid artery of a large male cat; the ligatures were allowed to remain: both the wounds healed in a fortnight, when the obliteration was found to be equally complete.

From these experiments and those before related, I conclude:

1. That after the proper application of the ligature, the adhesive process is established in equal time in an arterial trunk, whether its branches are contiguous or remote, and of course independently of the fluidity of the blood.

2. That the obstruction of a vessel by lymph is a sufficient safeguard from hemorrhage in ordinary circumstances, and the absence or slow formation of a clot appears to be referrible to some other cause besides the proximity of a branch.

I shall trouble the Society with only one or two concluding observations.

A ligature is of no farther use when the recent obstruction is complete, for the process of ulceration is so far advanced at seventy hours, as frequently to admit of the drawing away of the ligature with a very slight exertion of force, and it can surely yield no security where this has begun. The ulceration does not proceed with equal rapidity, because the pressure which occasions it is relieved, and the ligature is retained by a portion only of the external tunic of the vessel. It is a mistake therefore to suppose, that a ligature, because it remains fifteen or twenty days upon a vessel, is any barrier to the blood contained in it; and it is scarcely necessary to observe that the hemorrhage which

follows the forcible removal of a permanent ligature depends upon the rupture, not upon the absence, of the adhesion.

The organization of the lymph is subsequent to the commencement of the ulcerative or separating process, and probably in some instances to the completion of it. The vascularity of the lymph is made apparent by injection at the end of a fortnight, but is much more abundant in a month. Doubtless, however, its organization commences much earlier than it becomes visible. A layer of lymph of two lines in breadth, effused after the excision of a portion of conjunctiva, upon the sclerotic coat of the eye, does not exhibit vascularity for several days.

The ligature, if removed at all, should be removed in the interval which, it is plain from these experiments, takes place between the obstructing and separating processes. If it is attempted later, it is of less, if of any, advantage, as the ulceration has already commenced, which in the other case is prevented from taking place.

I have before stated the advantages which result from the removal of the ligature; they are too obvious to require being enforced. I have now endeavoured to show the limit of its effective operation, beyond which if retained, it affords none but a fallacious security, and is the sole cause of an ulcerative process, always tedious and not always free from danger.

The practical application of the facts and deductions contained in this and my former Essay, (Med. Chir. Trans. Vol. IV.) will probably be the subject of a future communication to the Society. It is however, in my judgment, a subject too important to be lightly disposed of; and it carries with it, in reference to surgical practice, a responsibility too serious to justify a rude and hurried trial of its merits. On these accounts I refrain from forcing the public opinion, by stating the immatured experience, in support or in opposition to the practice, which has hitherto obtained. Mr. Wilmot of Jervis Street Hospital, Dublin, to whom I beg to offer my thanks for his obliging permission to relate an interesting case of brachial aneurism, will, I hope, concur with me in thinking these reasons for its postponement satisfactory.

For the present therefore I content myself with submitting these observations to the profession, which, whether they do, or do not lead to any practical improvement, assist in elucidating a subject of admitted importance, and sufficiently explain the motive with which I entered upon the inquiry.

—— "*Neque enim fingendum, aut excogitandum, sed inveniendum quid Natura faciat aut ferat.*"

Nov. Organ. Lib. II. Aphor. 10.

Note on the use of Nitrat of Silver, for the detection of Arsenic, in reference to a paper on this subject in VOL. III. *of the Society's Transactions.* BY DR. MARCET.

I OFFERED to the Society three or four years ago, some remarks on this subject, which were published in the Third Volume of these Transactions. An objection to this mode of detection has since been pointed out to me by an ingenious student of Guy's Hospital; and the subject appears sufficiently important to require this early notice. The objection is this. If any alkaline phosphat be added to nitrat of silver; or if phosphoric acid be added to a solution containing silver and ammonia, a phosphat of silver falls down in the form of a yellow precipitate, closely resembling in appearance that which is formed by arsenic from the same re-agents, and having, like the latter, the property of being soluble both in nitric acid and in ammonia. Some ambiguity therefore might arise in applying the test of silver, for the purpose of detecting arsenic, if the suspected fluid happened to contain phosphoric acid, a circumstance by no means impossible. On examining the phosphat of silver, however, it will be found easily distinguishable from the arsenical salt in a variety of particulars, but more especially by its yielding neither a white smoke, nor a crystalline sublimate, when exposed to heat in a tube; and by its forming on charcoal, when urged by the blow-pipe, a greenish vitreous globule, which is, comparatively, of very difficult reduction.

The test of silver therefore, may, no doubt, with proper management, afford unquestionable indications as to

the presence or absence of arsenic; yet in cases of juridical information, the concurrence of other tests, and in particular that of sulphat of copper with potash, by which arsenic is precipitated in the form of Scheele's green pigment, is highly desirable.

But if the quantity of arsenic be not extremely minute, a proof still more satisfactory, and indeed the most perfect evidence that can be desired, will be readily obtained by heating the yellow precipitate in a tube, with a little pulverized charcoal and dry alkali, so as actually to obtain a pellicle of metallic arsenic on the inside of the tube. This *experimentum crucis* so justly recommended by chemists, supersedes, when the result is affirmative, all other chemical evidence; and it is the more easily performed by using silver for the precipitation of arsenic, as a bulky precipitate is obtained, which subsides very readily, and affords the means of bringing into a tangible form, and submitting to the process of reduction, quantities of arsenic too minute to be operated upon by any other method. It was in this way that I lately detected arsenic in the remains of a beverage by which a child had been poisoned, and I obtained in a tube, from the yellow precipitate, a distinct metallic coat, from a quantity of arsenic which could not exceed one tenth of a grain. I had also an opportunity of examining the contents of the stomach of the child, in which, however, not the least vestige of arsenic could be detected by any method, though the child's life had evidently been destroyed by that poison; so that during the few hours he had lived, after taking the fatal draught, the arsenic had been entirely expelled from his stomach.

ALEX. MARCET.

REFERENCES TO THE PLATES.

Plates I, II, and III, are illustrative of Mr. Howship's Paper on Ossification, and are explained, p. 289, *& sequent.*

Plate IV, *Fig.* 1, and 2, shew the form of the needle employed by Mr. Lawrence, in tying arteries in the operation for Aneurism, as described in p. 198.

Fig. 3. Represents the biliary calculus which produced symptoms resembling those of strangulated Hernia, in the case related by Mr. Thomas. See p. 102.

Fig. 4. Is an engraving of the urinary calculus, which was removed from a female without operation, in the case detailed by Dr. Yelloly. See p. 578.

Plates V, and VI, illustrate Mr. Travers's Paper on the Ligature of Arteries, p. 632.

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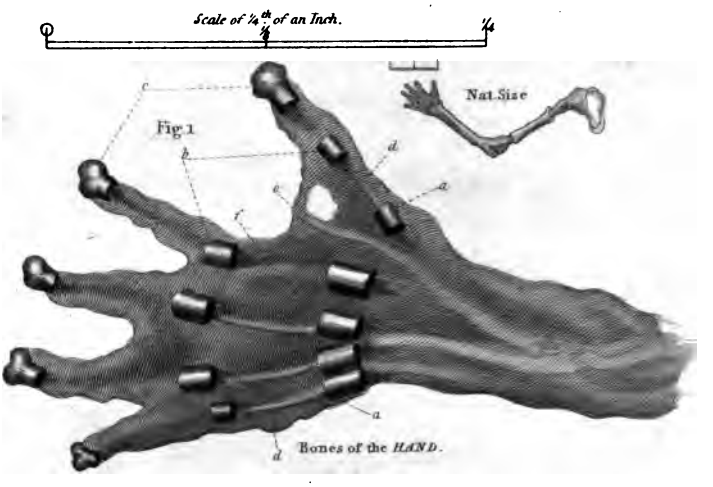
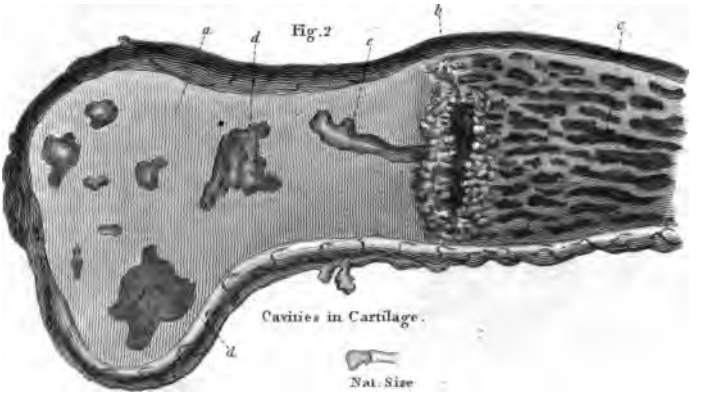
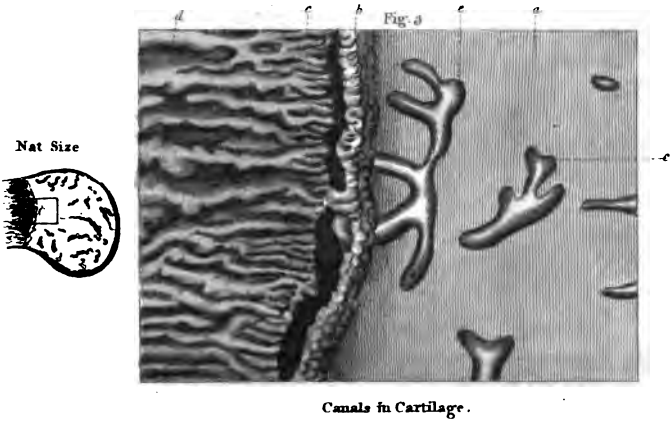
PLATE I.







Canals in Cartilage.

Shewbup del.

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PLATE II.

Fig. 4
The two Sets of Foramina. Ossifying Surface.
CALF

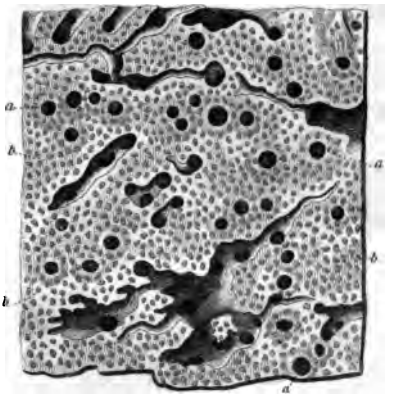
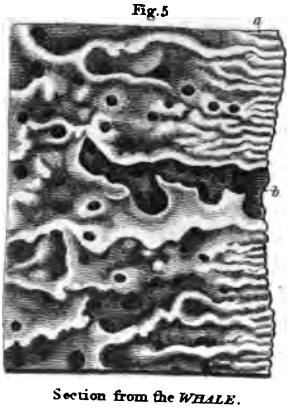


Fig. 5

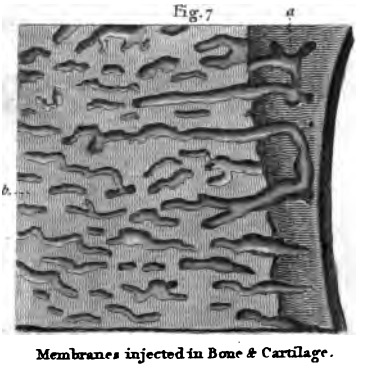


Section from the *WHALE*.

Fig. 6

Section of Bone.
PORPOISE

Fig. 7



Membranes injected in Bone & Cartilage.
GOOSE

Nat. Size

ap. del. *Milton.*

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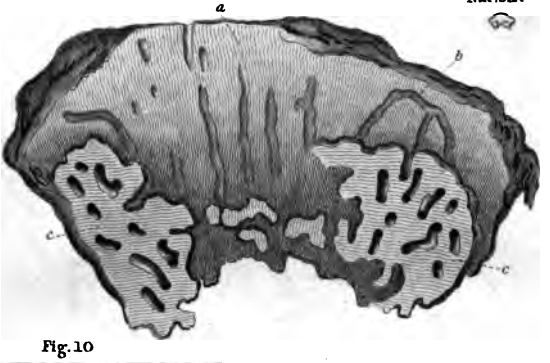
PLATE III.

Canals in Cartilage & Bone.

DUCK

Nat. Size

Fig. 8



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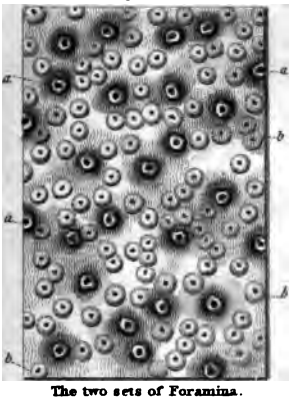
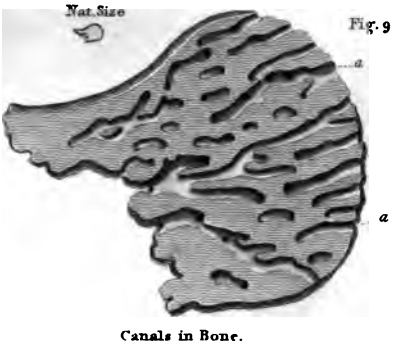


The two sets of Foramina.

GOOSE

Nat. Size

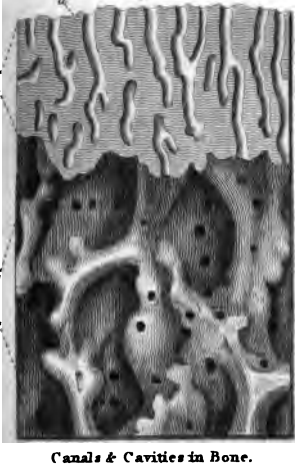
Fig. 9



Canals in Bone.

CHICK

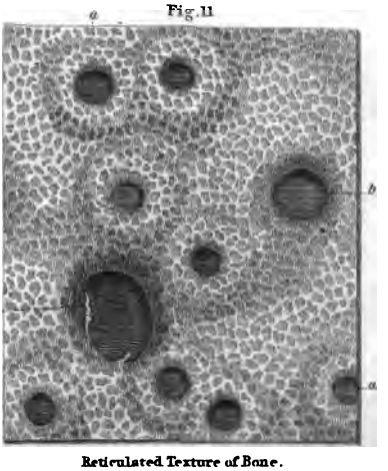
Fig. 12



Canals & Cavities in Bone.

GOOSE

Fig. 11



Reticulated Texture of Bone.

GOOSE

t.

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PLATE IV.

Fig.3.

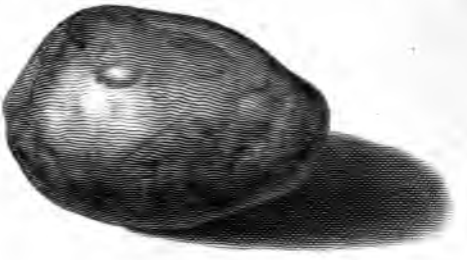

Fig.2.

Fig.1.

Fig.4.

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PLATE II.

Fig. 4
The two Sets of Foramina. Ossifying Surface.
CALF

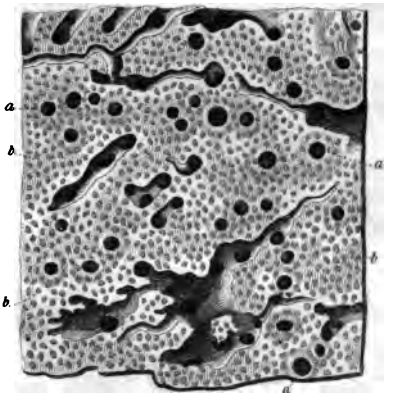
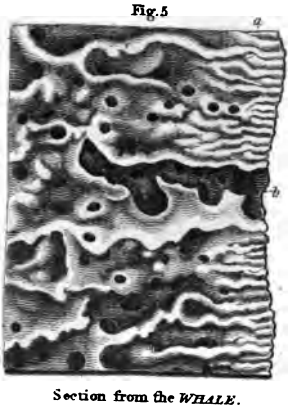


Fig. 5



Section from the *WHALE*.

Fig. 6

Section of Bone.
PORPOISE

Fig. 7

Nat. Size

Membranes injected in Bone & Cartilage.
GOOSE

ip. del.

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DUCK

Fig. 8

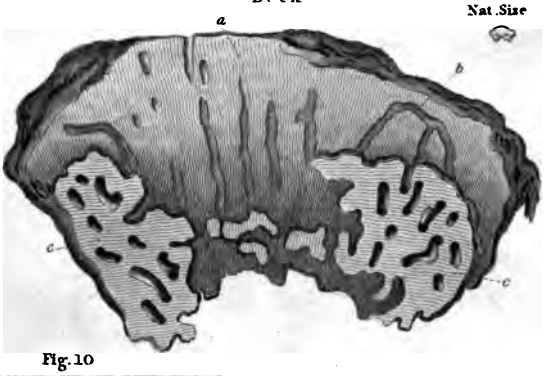
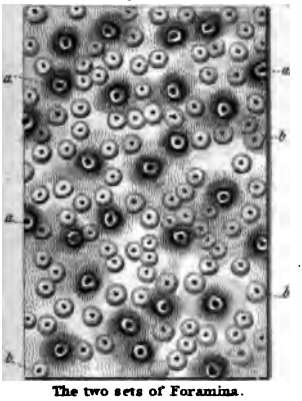


Fig. 10



The two sets of Foramina.

GOOSE

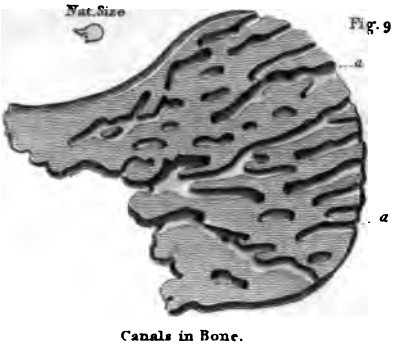
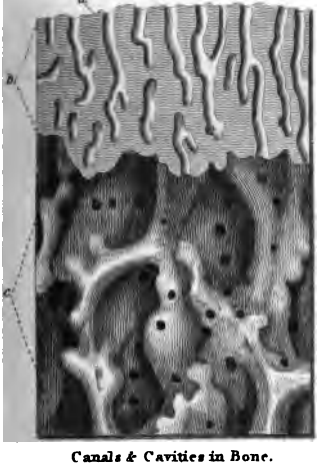


Fig. 9

Canals in Bone.

CHICK

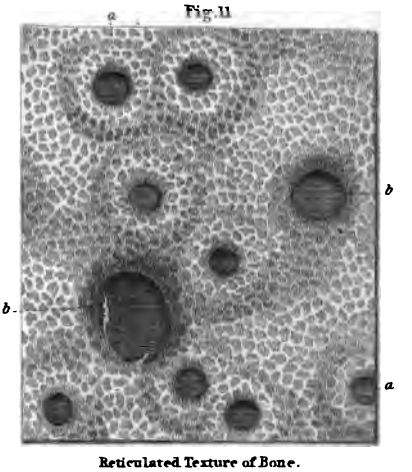
Fig. 12



Canals & Cavities in Bone.

GOOSE

Fig. 11



Reticulated Texture of Bone.

GOOSE

del.

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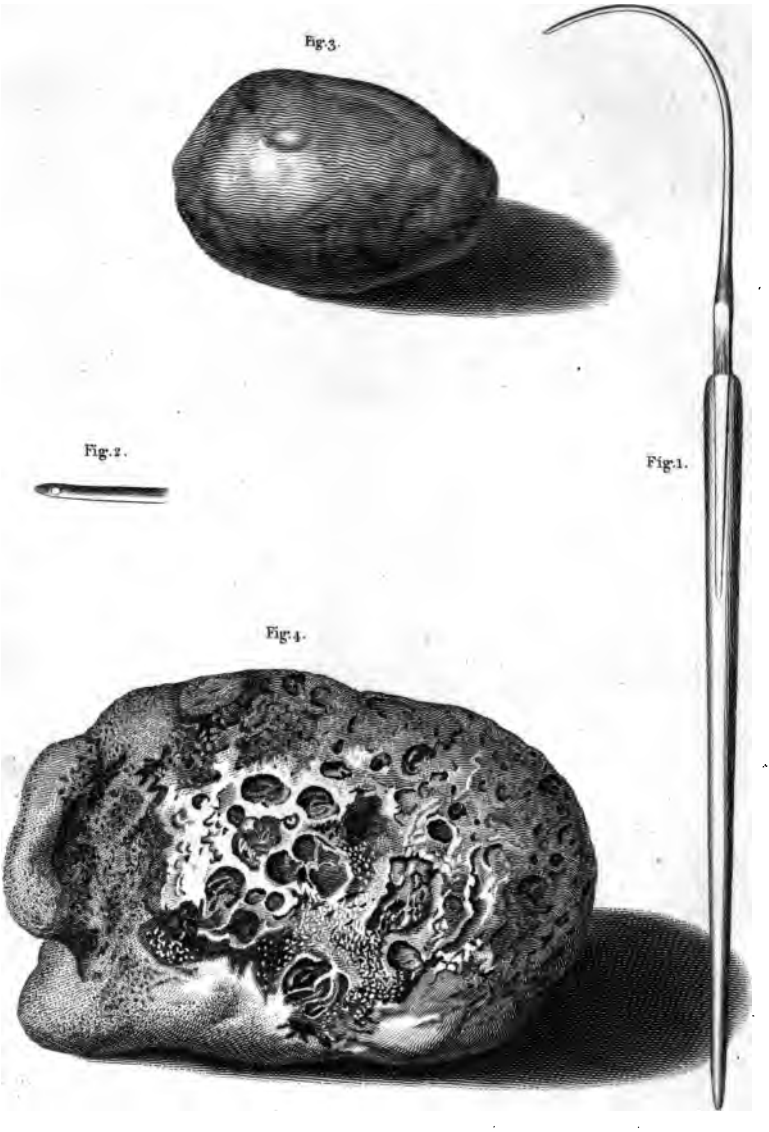
PLATE IV.



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Published by Longman, Hurst, Rees, Orme & Brown, Nov.r 1, 1815.

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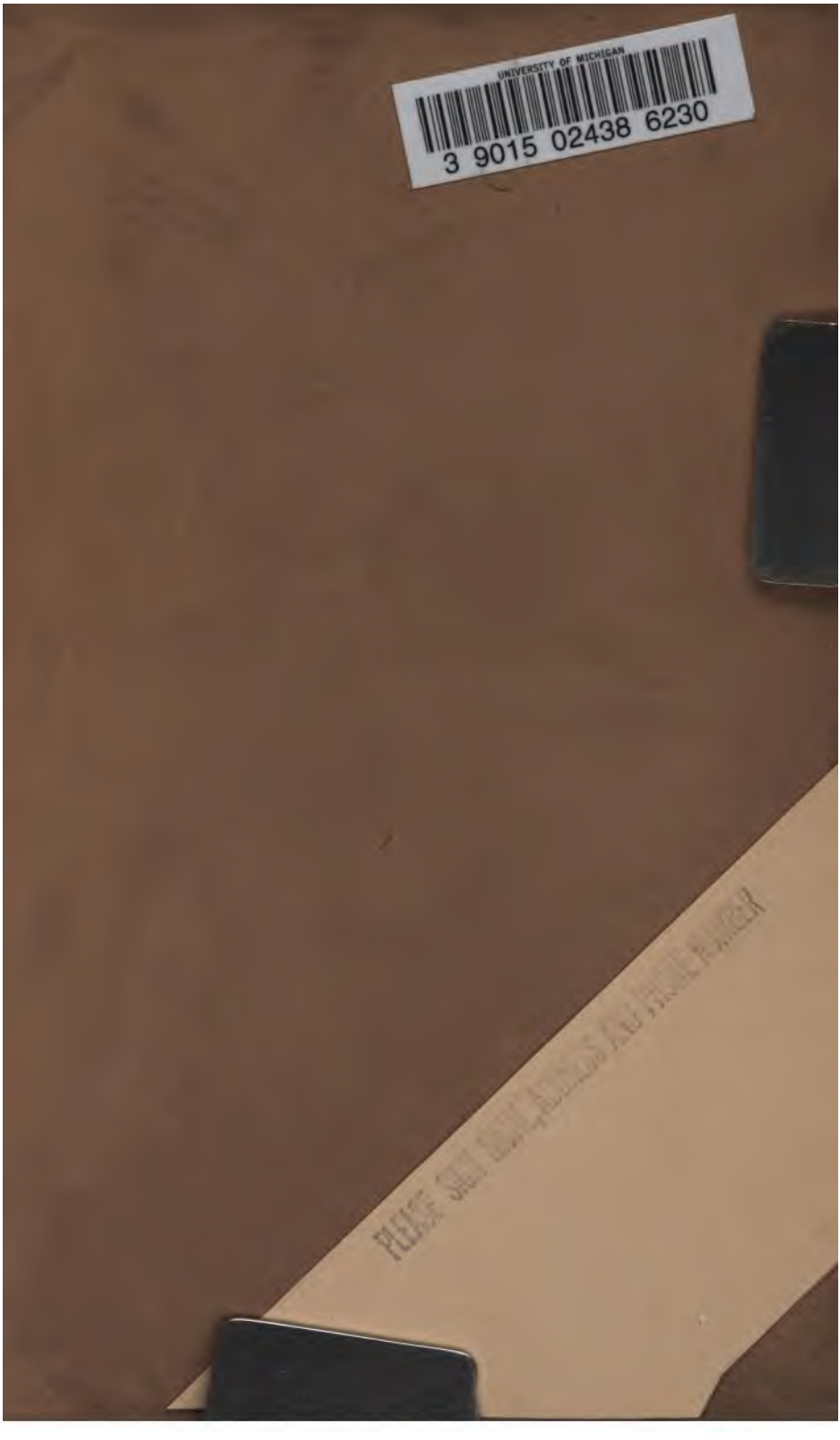
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